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THE POPULATION DEBATE: DIMENSIONS AND PERSPECTIVES

Papers of the World Population Conference
Bucharest, 1974

VOLUME I



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In some tables, the designations "developed" and "developing" economies are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process.

In the present publication, references to "China" are to be understood in the light of General Assembly resolution 2758 (XXVI) of 25 October 1971.

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PREFACE

The World Population Conference held at Bucharest, Romania, from 19 to 30 August 1974[1] was the third in a series of population conferences convened under the auspices of the United Nations. The first two conferences, which took place in Rome in 1954 and in Belgrade in 1965, were purely professional in nature. The Bucharest Conference, convened under Economic and Social Council resolution 1484 (XLVIII) of 3 April 1970, reflected the increasing concern with population questions in the world today and was a global conference of Governments which devoted its attention to the national and international population policies and action programmes needed to promote human welfare and development.

Four United Nations symposia on population questions were held prior to the Conference, in which experts addressed themselves to the substantive aspects of the complex interrelationships between population and the multiplicity of socio-economic and other factors which affect it and are in turn affected by it. These were: the Symposium on Population and Development (Cairo, 4-14 June 1973); the Symposium on Population and the Family (Honolulu, 6-15 August 1973); the Symposium on Population, Resources and the Environment (Stockholm, 26 September-3 October 1973); and the Symposium on Population and Human Rights (Amsterdam, 21-29 January 1974). The reports of the symposia, which were before the Conference, form annexes I to IV to volume II of the present publication.

It will be noted that the topics of the four symposia went beyond what used to be called "formal demography". This was necessary in view of the crucial importance of population in development and also of the mutual relationship between man and his environment, a relationship which involves not only social and economic factors but cultural factors, family structure and human rights, as well as the physical environment.

[1] The *Report of the World Population Conference* will be issued as a United Nations publication under the symbol E/CONF 60/19.

It was also necessary to supplement the material of the four symposia in order to cover other aspects of population. For this purpose, background papers were prepared covering a variety of topics ranging from demographic analysis to research and training, biomedical aspects, ecological aspects, population policies and family planning These papers were made available to Governments prior to the Conference.

Digests of all of these papers—documents and reports of the symposia as well as background papers—were prepared in order to provide the participants in the Conference with concise summaries, corresponding to four of the items on the agenda of the Conference, namely, "Recent population trends and future prospects"; "Population change and economic and social development"; "Population, resources and environment"; and "Population and the family".

In continuation of the tradition of publishing the papers of the United Nations world population conferences, the United Nations presents in *The Population Debate. Dimensions and Perspectives* all the substantive documents that were prepared for the World Population Conference, 1974, including the main conference documents and the background papers, as well as the documents and the reports of the four symposia. In addition, part one of volume I gives the text of the World Population Plan of Action adopted by the Conference.

It is hoped that this collection of papers will, *inter alia*, serve the needs of the large number of professionals —not demographers only but also economists, sociologists, ecologists, medical scientists and others— whose interests cover population questions but who were unable to attend the Conference.

Acknowledgements are due to the large number of consultants and various United Nations offices and specialized agencies which helped the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat in preparing the documents, as well as to the United Nations Fund for Population Activities, whose grant made this publication possible.

COMPOSITION OF THIS PUBLICATION

The papers of the World Population Conference, 1974, are published under the title *The Population Debate: Dimensions and Perspectives*. They are arranged in two volumes under the following headings:

Volume I

Part One. The population debate: a digest

Part Two. World demographic situation and prospects

Part Three. Demographic data collection, research and training

Part Four. Population and development

Volume II

Part Five. Population, resources and the environment

Part Six. Population and the family

Part Seven. Population and human rights

Part Eight. Family planning

Part Nine. Population policies and programmes

Annex I. Report of the Symposium on Population and Development

Annex II. Report of the Symposium on Population, Resources and Environment

Annex III. Report of the Symposium on Population and the Family

Annex IV. Report of the Symposium on Population and Human Rights

The papers are reproduced in their original languages. They have been edited and consolidated in accordance with United Nations practice and requirements.

All general cross references to papers contained in these volumes are given in the following form:

Name of author, title of paper, *Population Debate,* vol. I or vol. II, part one, two, ... Specific references are to paragraph numbers, tables or figures in the paper cited.

CONTENTS

Volume I

EXPLANATORY NOTES

The following symbols have been used in the tables throughout the report:

Three dots (. . .) indicate that data are not available or are not separately reported

A dash (—) indicates that the amount is nil or negligible

A blank in a table indicates that the item is not applicable

A minus sign (-) indicates a deficit or decrease, except as indicated

A full stop (.) is used to indicate decimals

A comma (,) is used to distinguish thousands and millions

A slash (/) indicates a crop year or financial year, e.g., 1970/71

Use of a hyphen (-) between dates representing years, e.g., 1971-1973, signifies the full period involved, including the beginning and end years.

Reference to "tons" indicates metric tons, and to "dollars" ($) United States dollars, unless otherwise stated.

Part One

THE POPULATION DEBATE: A DIGEST

RECENT POPULATION TRENDS AND FUTURE PROSPECTS

Report of the Secretary-General

GROWTH OF POPULATION

1. In this World Population Year, 1974, the extraordinary proliferation of humanity which has been so outstanding a feature of the modern age continues unabated The estimated number of the earth's human inhabitants, approximately 2 5 thousand million in 1950, reached 3 9 thousand million early in 1974 The milestone of 4 thousand million is expected to be passed during 1975, marking an increase of some 60 per cent during the past quarter of a century Growing now at the highest rate ever of almost 2 per cent per annum, the population will increase during the current year by nearly 80 million—more than enough to form half a dozen metropolitan agglomerations of the size of Greater New York or Greater Tokyo, or to people a continent the size of Australia at six times the current Australian population density.

2. We are witnessing the climax of a trend of accelerating growth of world population which began some 200 years ago, at about the same time as the start of the Industrial Revolution in Europe. Before that time, during the 10,000 years or more since the beginnings of agriculture, the number of the human race increased very slowly, taking on average more than 1,000 years to double By comparison, its growth during the past two centuries has been explosive. Between 1750 and 1900, according to the estimates reproduced in table 1, the world population doubled approximately in 150 years, rising from about 800 million to 1,650 million The trend gathered more speed during the first half of the twentieth century, as the population increased about 50 per cent between 1900 and 1950. Since 1950, the speed of growth has been prodigious The annual rate of increase jumped from an estimated average of 0 8 per cent for 1900-1950 to 1 8 per cent for 1950-1960 and advanced in 1960-1970 to 1 9 per cent At this rate, numbers double in about 37 years

3 If future events bear out the assumptions of the world population projections shown in table 1, the annual percentage rate of increase will slacken a little between now and the year 2000, but world population will still be growing in the 1990s about as rapidly as it did during the 1950s Meanwhile, the yearly increment in the absolute number of the earth's human inhabitants will grow larger and larger, exceeding 100 million a year in the 1990s according to the projections It is likely to be a long time before the momentum of this growth is spent, and when the growth comes to an end, as ultimately it must, the world population will probably be several times larger than it is now

4 A conspicuous feature of table 1 is the uneven distribution of population increase among the regions of the world since 1950 and especially since 1960 Most of the increase has taken place in those parts of the world where incomes are lowest and opportunities for education and productive employment of the rising generations are least favourable. While the populations of the more developed regions (Europe, the Union of Soviet Socialist Republics, Japan, Northern America, Temperate South America, Australia and New Zealand) grew between 1960 and 1970 at the relatively moderate

TABLE 1. GROWTH OF WORLD POPULATION, 1750-1970, AND PROJECTIONS TO 2000

	Estimated population (millions)		
Date	*World total*	*More developed regions* [a]	*Less developed regions* [b]
1750	791	201	590
1800	978	248	730
1850	1,262	347	915
1900	1,650	573	1,077
1950	2,506	857	1,649
1960	2,995	976	2,019
1970	3,621	1,084	2,537
1980	4,401	1,183	3,218
1990	5,346	1,282	4,064
2000	6,407	1,368	5,039

Period	Annual increase (millions)			Annual rate of growth (percentage)		
	World total	More developed regions [a]	Less developed regions [b]	World total	More developed regions [a]	Less developed regions [b]
1750-1800	3.7	0.9	2.8	0.4	0.4	0.4
1800-1850	5.7	2.0	3.7	0.5	0.7	0.5
1850-1900	7.8	4.5	3.2	0.5	1.0	0.3
1900-1950	17.1	5.7	11.4	0.8	0.8	0.9
1950-2000	78.0	10.2	67.8	1.9	0.9	2.2
1950-1960	48.9	11.9	37.0	1.8	1.3	2.0
1960-1970	62.6	10.8	51.8	1.9	1.0	2.3
1970-1980	78.0	9.9	68.1	2.0	0.9	2.4
1980-1990	94.5	9.9	84.6	1.9	0.8	2.3
1990-2000	106.1	8.6	97.5	1.8	0.6	2.2

SOURCE: For 1750-1950: J. D. Durand, "The modern expansion of world population", *Proceedings of the American Philosophical Society*, vol. 111 (1967), p. 137 ("medium" estimates). For 1950-2000: population estimates and projections available to the United Nations as of March 1974.

[a] Europe, USSR, Japan, Northern America (Canada and United States of America), Temperate South America (Argentina, Chile and Uruguay), Australia and New Zealand.

[b] All other regions.

average annual rate of 1.0 per cent, the rate of growth in the less developed regions was more than twice as high. With two thirds of the world population in 1960, the less developed regions received more than four fifths of the increase during this decade. An even more unbalanced distribution of increases is foreseen during the decades ahead. In the 1990s, according to the projections, the currently less developed regions will be gaining population at the rate of 98 million a year, seven eighths of the projected annual increase in the world as a whole.

5. A view of the trend in each region of the world is provided by the estimates and projections in table 2.[1] The regions of slowest growth are those of Europe, with annual average growth rates since 1950 ranging from about 0.5 to 1.0 per cent. Slight decreases in the growth rates of the European regions are indicated by the projections from 1970 to 2000. Australia and New Zealand and Temperate South America are the fastest growing of the more developed regions, with growth rates in the vicinity of 2 per cent per annum during the 1950s and 1960s. Immigration is an important factor, especially in Australia and New Zealand. Both in that region and in Temperate South America, a decided diminution of the growth rates is foreseen in future decades. Diminishing growth rates are indicated also by the projections for the USSR, Japan and Northern America.

6. Growth rates of 3 per cent or higher during the 1960s are estimated for Tropical South America, Middle America, and Polynesia and Micronesia. In Tropical South America, Brazil, a rising demographic giant, contained 93 million of the estimated regional population of 155 million in 1970. Western, Northern and Eastern Africa and South-West Asia will be added to the list of regions with population increasing at 3 per cent or more per annum in the 1980s, according to the projections. Growth rates of slightly less are projected

[1] A full list of the countries and areas included in each region is given in the *Demographic Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XIII.1), p. 16. Countries and areas having a 1970 population of 1 million or more are listed below in decreasing order of population size within each region:

Western Europe: Federal Republic of Germany, France, Netherlands, Belgium, Austria, Switzerland;
Northern Europe: United Kingdom, Sweden, Denmark, Finland, Norway, Ireland;
Southern Europe: Italy, Spain, Yugoslavia, Portugal, Greece, Albania;
Eastern Europe: Poland, Romania, German Democratic Republic, Czechoslovakia, Hungary, Bulgaria;
Union of Soviet Socialist Republics;
Japan;
Northern America: United States of America, Canada;
Temperate South America: Argentina, Chile, Uruguay;
Australia and New Zealand;
China;
Other East Asia: Hong Kong, Republic of Korea, Democratic People's Republic of Korea, Mongolia;
South-East Asia: Indonesia, Democratic Republic of Viet-Nam, Republic of Viet-Nam, the Philippines, Thailand, Burma, West Malaysia, East Malaysia, Khmer Republic, Laos, Singapore;
Middle South Asia: India, Pakistan, Iran, Afghanistan, Sri Lanka, Nepal;
South-West Asia: Turkey, Iraq, Saudi Arabia, Syrian Arab Republic, Israel, Lebanon, Jordan, Democratic Yemen;
Northern Africa: Egypt, Sudan, Morocco, Algeria, Tunisia, Libyan Arab Republic;
Western Africa: Nigeria, Ghana, Upper Volta, Mali, Ivory Coast, Senegal, Guinea, Niger, Sierra Leone, Dahomey, Togo, Liberia, Mauritania;
Eastern Africa: Ethiopia, United Republic of Tanzania, Kenya, Uganda, Mozambique, Madagascar, Southern Rhodesia, Malawi, Zambia, Rwanda, Burundi, Somalia;
Middle Africa: Zaire, Angola, United Republic of Cameroon, Chad, Central African Republic;
Southern Africa: South Africa, Lesotho;
Tropical South America: Brazil, Colombia, Peru, Venezuela, Ecuador, Bolivia, Paraguay;
Middle America, mainland: Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama;
Caribbean: Cuba, Haiti, Dominican Republic, Puerto Rico, Jamaica, Trinidad and Tobago;
Melanesia: Papua New Guinea.

TABLE 2. GROWTH OF POPULATION IN REGIONS OF THE WORLD, 1950-1970, AND PROJECTIONS TO 2000

Region	Population (millions)						Annual rates of growth (percentage)				
	1950	1960	1970	1980	1990	2000	1950-1960	1960-1970	1970-1980	1980-1990	1990-2000
World total	2,506	2,995	3,621	4,401	5,346	6,407	1.8	1.9	2.0	1.9	1.8
More developed regions, total	857	976	1,084	1,183	1,282	1,368	1.3	1.1	0.9	0.8	0.6
Western Europe	122	135	148	157	165	171	0.9	1.0	0.6	0.5	0.4
Northern Europe	72	76	80	84	88	91	0.5	0.6	0.4	0.4	0.4
Southern Europe	109	118	128	137	147	156	0.8	0.8	0.7	0.7	0.6
Eastern Europe	88	97	103	110	116	122	0.9	0.6	0.6	0.5	0.5
USSR	180	214	243	269	297	321	1.7	1.2	1.0	1.0	0.8
Japan	84	94	104	118	126	133	1.2	1.0	1.2	0.7	0.5
Northern America	166	199	226	249	275	296	1.8	1.3	0.9	1.0	0.7
Temperate South America	25	31	36	42	48	53	1.9	1.6	1.4	1.3	1.0
Australia and New Zealand	10	13	15	18	22	25	2.3	1.9	1.8	1.6	1.3
Less developed regions, total	1,649	2,019	2,547	3,218	4,064	5,039	2.0	2.3	2.4	2.3	2.2
China	557	654	772	907	1,033	1,152	1.6	1.7	1.6	1.3	1.1
Other East Asia	33	39	50	62	75	88	1.8	2.4	2.1	2.0	1.6
South-East Asia	173	219	285	374	490	617	2.3	2.6	2.7	2.7	2.3
Middle South Asia	481	588	749	971	1,255	1,584	2.0	2.4	2.6	2.5	2.3
South-West Asia	44	58	77	104	140	183	2.7	2.8	3.0	3.0	2.7
Northern Africa	51	65	86	114	154	202	2.4	2.8	2.8	3.0	2.7
Western Africa	65	80	101	133	179	241	2.1	2.4	2.7	3.0	3.0
Eastern Africa	63	77	100	132	180	246	2.1	2.6	2.8	3.1	3.1
Middle Africa	26	32	40	51	67	89	1.9	2.4	2.4	2.7	2.8
Southern Africa	14	18	24	32	42	56	2.4	2.9	2.8	2.8	2.7
Tropical South America	86	116	155	207	274	351	3.0	2.9	2.9	2.8	2.5
Middle America, mainland	36	49	67	93	128	173	3.1	3.2	3.2	3.2	3.0
Caribbean	17	21	26	32	40	49	2.0	2.1	2.2	2.2	2.0
Melanesia	2	2	3	4	5	6	2.1	2.4	2.6	2.8	2.7
Polynesia and Micronesia	1	1	1	1	2	2	2.8	3.4	2.6	2.4	2.0

SOURCE. Population estimates and projections available to the United Nations as of March 1974

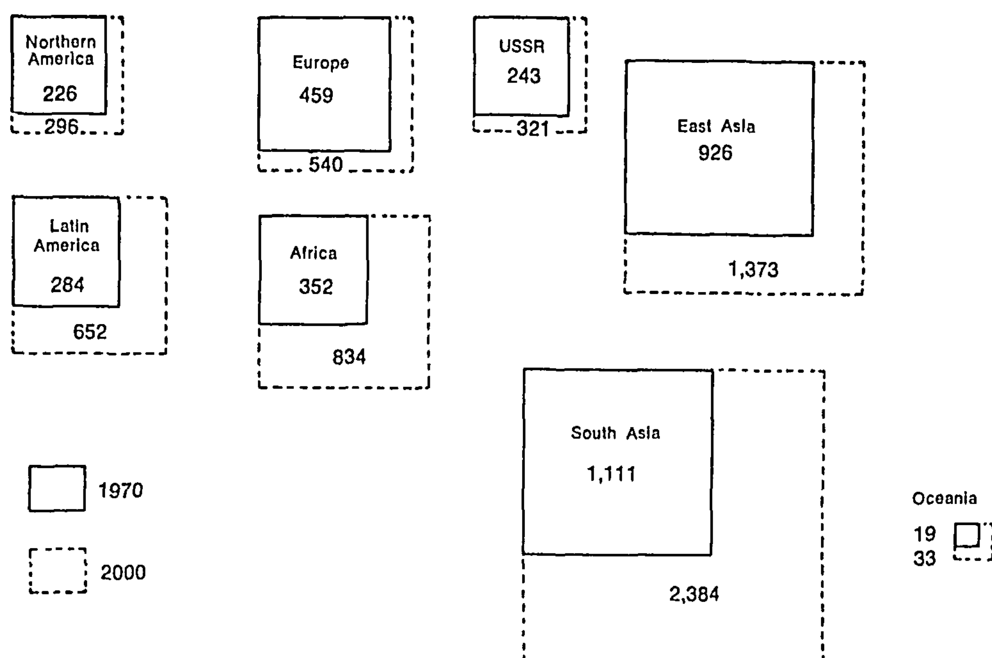
for the 1970s in South-East Asia (including Indonesia, another of the world's most populous countries, with an estimated 1970 population of 120 million), and also in the massive population of Middle South Asia (where the trend is dominated by India, with 548 million as [illegible] Asia, Tropical South America, and Middle America, and in the 1990s in Western, Eastern and Middle Africa. However, population will still be growing at rates approximating 3.0 per cent during the 1990s in two African regions.

7. When considering the implications of these projections, the reader should bear in mind that future trends of population cannot be foreseen with certainty. There is a difference between projection, "the numerical elaboration of a set of assumptions made in order to illuminate data referring to the present or past",[2] and prediction, the attempt to foretell what will actually take place in the future. The projections set forth in the tables in this report are a synthesis of the results of efforts by demographers of the various countries and the United Nations Secretariat to formulate realistic assumptions with regard to future trends in view of information about current conditions and past experiences The assumptions that have been selected are by no means infallible. On the contrary, even the most carefully reasoned projections, with the firmest statistical support, may often go wide of the mark. Risks of error are all the greater where reliable measures are lacking for the size and structure of the current population, its changes in the recent past, and the levels and trends of fertility, mortality and migration

[2] Nathan Keyfitz, "On future population", *Journal of the American Statistical Association*, vol 67, No 338 (July 1972), p 353.

BIRTHS, DEATHS AND NATURAL INCREASE

8. What has spurred the leaping growth of population is improvement in the conditions of mortality. The peoples of the modern world enjoy a measure of protection against disease and famine which was unknown in the past, as well as more or less substantially increased means for satisfying the material needs of healthy life. Prior to the past two centuries, expectation of life at birth as high as 35 years was an exceptionally favourable condition which seldom continued very long in any part of the world, and expectation of less than 25 years was not uncommon.



Note: Numbers refer to population in millions, 1970 and 2000.

Now the expectation attains 55 years on the world average and 70 years in the more developed regions, and remains below 40 years in a dwindling minority of countries that have shared least in the benefits of modern economic development and health-protective technology. It is estimated that the world average life expectancy gained 20 years between 1935-1939 and 1965-1970.[3]

9. The decrease of mortality rates has greatly strengthened the biological power of multiplication of the species. Most important in this respect are the probabilities that an infant will survive to reproductive age and that a survivor to such age will live out the full span of potentially reproductive years. The following measures from the life tables of India and Sweden exemplify the gains that have been achieved in these probabilities:

	India		*Sweden*	
	1891-1901	*1951-1960*	*1901-1910*	*1961-1965*
Female expectation of life at birth (years)	24.0	40.6	57.0	75.7
Probabilities of survival of females:				
From birth to age 15	.49	.73	.85	.98
From age 15 to 50	.43	.58	.80	.96
From birth to age 50	.21	.43	.68	.94

SOURCE: Data from *Demographic Yearbook, 1957*, and *ibid., 1966* (United Nations publications, Sales Nos. 58.XIII.1 and 67.XIII.1).

10. It is reasonable to expect that the improved chances of survival will eventually be balanced by increasing restraint of reproduction. This expectation is incorporated in the so-called "theory of the demographic transition", with regard to the typical sequence of changes in vital rates of a population undergoing economic development and associated processes of modernization. At first, according to this theory, the growth of the population is accelerated as mortality declines while fertility remains at a high level or possibly rises. Sooner or later, this growth is expected to be checked by a decline of fertility, induced by changing economic and social conditions in the process of development and/or by pressures on families resulting from the increased probability of children's survival. In the final phase of the transition, an equilibrium of

[3] Estimates for the world are taken from United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 4.

fertility and mortality, both at low levels, is postulated in some versions of the theory; while in one version at least, fertility is seen as ultimately falling below mortality so that the population decreases [4]

11. In fact, in all countries that have reached high levels of socio-economic development and modernization, the decrease of mortality has been countered to a great extent by reduced fertility, although the changes have not always followed the sequence postulated by the transition theory and although some excess of fertility over mortality still persists in a majority of cases The movement to curb fertility began in some countries during the early stages of their modern economic development; notable examples are France, where the decreasing trend of fertility seems to have begun during the last decades of the eighteenth century, shortly after the French Revolution, and the United States of America, where such a trend apparently began in the early years of the nineteenth century if not before. This movement became general among the countries of northern, western and central Europe during the last quarter of the nineteenth century and among those of southern and eastern Europe during the first quarte of the present century. The last to join the ranks of th low-fertility countries was Japan, where the decisiv phase of the transition took place between 1947 and 1957.

12. Table 3 portrays the history of the transition of mortality and fertility in Sweden, a fairly typica example of the experience of many European countries and one which is most fully documented with statistica records Mortality is measured here by the expectatior of life at birth, an index of the over-all level of mortality rates according to age; and fertility by the gros reproduction rate, a corresponding index of the leve of fertility rates in the female population according t age The gross reproduction rate represents the averag number of daughters that would be born to a generatior of women reproducing at the age-specific fertility rate: recorded in each specified period, if none of the materna generation died before the age of completed potentia fertility The balance of fertility and mortality i: measured by the net reproduction rate, which differ: from the gross rate in that it takes account of the los of reproduction due to mortality in the materna generation, thus, it represents the ratio between th numbers of the daughter generation and the materna generation under the existing conditions of fertility anc mortality. A net reproduction rate of unity signifies tha fertility is just enough to balance mortality and replace

[4] Regine K Stix and Frank W Notestein, in *Controlled Fertility An Evaluation of Clinic Service* (Baltimore, 1940), wrote "Our own experience (in the United States) and that of western Europe point clearly to the fact that voluntary parenthood will result in eventually declining numbers unless new factors enter the situation"

TABLE 3. SWEDEN INDEXES OF MORTALITY AND FERTILITY AND CRUDE BIRTH, DEATH AND NATURAL INCREASE RATES, 1778-1971

Period	*Expectation of life at birth* [a]	*Reproduction rates*		*Annual vital rates per 1,000 population*		
		Gross	*Net*	*Births*	*Deaths*	*Natural increase*
1778-1797	36 6	2 13	1 17	33 4	26 4	7 0
1798-1817	36 6	2 08	1 16	31 9	27.1	4 8
1818-1837	41 2	2 25	1 42	33 5	23.6	9 9
1838-1857	42 4	2 12	1 36	31 2	21 6	9.6
1858-1877	45 1	2.16	1 42	31 7	19.5	12 2
1878-1897	50 4	2 04	1 44	28 5	16.8	11 7
1898-1907	54 2	1 89	1 43	26 2	15.6	10 6
1908-1917	58 0	1 61	1.30	23 3	14 0	9 3
1918-1927	60 0	1 25	1 04	19 2	13 0	6.2
1928-1932	63 1	0 93	0 81	15.2	12 0	3.2
1933-1937	65 0	0 83	0 74	14 0	11 6	2.4
1938-1942	67.0	0 93	0 86	15 8	11 1	4 7
1943-1947	68 9	1.22	1 15	19 8	10 7	9.1
1948-1952	71 4	1.12	1 08	16 6	9 8	6 8
1953-1957	72 6	1 09	1 06	14 8	9 6	5 2
1958-1962	73 4	1.08	1 05	14 0	9 8	4 2
1965-1969	74 2 [b]	1 08	1 06	15 0	10 2	4 8
1970		0 94	0 92	13.7	9 9 [c]	3 8 [c]
1971		0 96		14 1 [c]	10 2 [c]	3 9 [c]

SOURCE· For 1778-1962 Nathan Keyfitz and Wilhelm Flieger, *World Population An Analysis of Vital Data* (Chicago and London, University of Chicago Press, 1968), pp 36-37. The figures shown here are simple averages of values for five-year time intervals within the

[a] Simple averages of values for males and females, in years
[b] 1966-1970
[c] Provisional

the population in successive generations. The current crude birth, death and natural increase rates per 1,000 of the total population are the results of interaction between the mortality and fertility rates and the age structure of the population. This structure is itself a product of the levels and past changes of fertility and mortality, modified appreciably in some cases by migration.

13. In Sweden, at the end of the eighteenth century, the expectation of life was already well above the world average; and although the fertility of Swedish women was below the world average, it was more than enough to replace the population under the relatively favourable conditions of mortality. With the progress of economic and social development, the expectation of life in Sweden increased steadily from an average of 36.6 years in 1798-1817 to more than double that figure in 1958-1962. More recently, it has continued to rise at a much slower pace, which suggests that it is likely to level off in the near future. Swedish fertility increased somewhat from 1798-1817 to 1818-1837, then entered a decline which proceeded slowly and irregularly until the 1890s and much more rapidly from that time until the 1930s. At the high point of fertility in 1818-1837, the net reproduction rate rose to an average of 1.42, and it remained at approximately that level through the rest of the nineteenth century, as the decrease of mortality was approximately balanced by the decrease of fertility. The excess of annual birth rates over death rates reached its maximum in the second half of the century with annual rates of natural increase averaging approximately 12 per 1,000 population. This was rapid population growth compared with the average in less developed regions of the world at that time, but very moderate compared with what is currently going on in those regions. After the 1890s, the decrease of fertility outpaced the decrease of mortality in Sweden, with the result that the net reproduction rate and the annual rate of natural increase diminished progressively until 1933-1937. At that time, in the depths of the Great Depression, Swedish fertility sank more than 25 per cent below the level required to replace the population in the long run. However, the current birth rate remained slightly above the death rate on account of a favourable age structure of the population, with a swollen proportion of adults at reproductive ages, the survivors of generations born in earlier times of higher fertility. A revival of fertility followed, which brought the net reproduction rate again above unity between 1943-1947 and 1965-1969, then a slump to a net rate of 0.92 in 1970. At that time, as in the 1930s, the population structure kept the birth rate slightly above the death rate although fertility was no longer enough to replace the population in future generations.

14. The long-term declining trend of fertility to a nadir in the 1930s, the revival in the 1940s and 1950s, and the recent relapse are typical of the experience of the industrialized countries of north-western Europe, Northern America and Oceania. In some cases, the rise from the nadir and the recent fall were much m pronounced than in Sweden.[5] In the United States America, the net reproduction rate fell to 0.88 in 19 1936,[6] rose to 1.71 in 1959-1961,[7] and dropped 1.16 in 1968,[8] the year of the most recent availa measure. The United States birth rate has decrea considerably since 1968 and it is apparent that ferti has again fallen below the replacement level, as it in the 1930s. The pattern of up-and-down swings si the 1930s in the United States and other West industrialized countries suggests that fertility has beco quite sensitive to temporary variations of economic a other conditions and may continue to oscillate in t way in the future. It is hard to tell whether the rec decreases represent only such an oscillation or a last reduction of fertility in these countries. No su pattern of oscillations is apparent in the fertility tre of southern and eastern European countries and Union of Soviet Socialist Republics up to the pres time. Their gross and net reproduction rates ha continued, on the whole, to follow declining tre until recent years. Hungary and Czechoslovakia, li Sweden (and also Denmark), had fertility below t replacement level in the years of the latest availal measures.

15. In less developed countries, progress in reduci mortality was greatly impeded during the ninetee century by economic handicaps; consequently, in sp of generally high birth rates, most of them lagged behi the more developed countries in population grow before 1900. Their growth quickened during the fi half of the present century and especially after the Fi World War, when mortality rates began to decrea more steadily, more rapidly and more generally in le developed regions of the world. This trend accelerat dramatically after the Second World War, as illustrat in table 4 by the example of Mauritius, one of the fe less developed countries that possesses long historic records of reliable vital statistics and where a decid fertility decline has made its appearance.[9] The expe tation of life in Mauritius jumped from 33 years 1942-1946 to 51 years in 1951-1953 and 60 years 1961-1963, for a total gain of 27 years in two decade This was more than Sweden gained in 125 years fro 1800 onward. Among other examples of large gains expectation of life in less developed countries since t 1940s are those of Sri Lanka (46 years in 1945-1947, 58 in 1955, and nearly 64 years in 1962-1964); Mexic

[5] A time-series of gross and net reproduction rates ar related vital indexes for many countries is given in *Populatio Index*, vol. 39, No. 2 (April 1973).

[6] Nathan Keyfitz and Wilhelm Flieger, *World Populatio An Analysis of Vital Data* (Chicago and London, Universi of Chicago Press, 1968), p. 27.

[7] *Ibid.*, p. 27.

[8] *Population Index*, vol. 39, No. 2 (April 1973).

[9] Mauritius is a small island in the Indian Ocean and n representative of any large region. However, less develope countries with a long series of reliable vital statistics are ve few; hence, this example was selected.

[10] N. K. Sarkar, *The Demography of Ceylon* (Colomb 1957), p. 120.

TABLE 4 MAURITIUS INDEXES OF MORTALITY AND FERTILITY AND CRUDE BIRTH, DEATH AND NATURAL INCREASE RATES, 1900-1971

Period	Expectation of life at birth [a]	Reproduction rates		Annual vital rates per 1,000 population		
		Gross	Net	Births	Deaths	Natural increase
1901-1910				36.2	37.6	-1.4
1911-1920				36.3	36.4	-0.1
1920-1930				37.5	29.5	8.0
1930-1939				32.5	29.5	2.9
1940-1949	33.0[b]			38.0	25.5	12.5
1950-1954	51.0[c]			46.2	15.1	31.1
1955-1959	55.6[d]	2.84	2.30	41.1	11.9	29.2
1960-1964	60.3[e]	2.94	2.53	38.9	9.7	29.2
1965		2.70	2.39	35.4	8.6	26.8
1966		2.66	2.35	34.9	8.8	26.1
1967		2.26	2.00	30.6	8.5	22.1
1968		2.24	1.98	30.6	9.0	21.6
1969				27.7	8.0	19.7
1970				26.0	7.8	18.2
1971				25.3[f]	7.6[f]	17.7[f]

[illegible]

[c] 1951-1953
[d] 1956-1958
[e] 1961-1963
[f] Provisional

(estimate of 41.5 years in 1940,[11] 50 years in 1950, and over 62 in 1965-1970), and Puerto Rico (46 in 1939-1941, 61 in 1949-1951, and over 70 years in 1965). In the general average of less developed regions, *it is estimated that expectation of life at birth rose from* about 30 years in 1935-1939 to about 42 years in 1950-*1955* and *50 years in 1965-1970.*[12]

16. Until the 1960s, the decrease of mortality was not offset by any substantial decreases of fertility in less developed countries. On the contrary, the birth rates of some of these countries rose from high to still higher levels in the 1950s, as in the example of Mauritius The effect was to push the rates of population growth sharply upward above 2 per cent per annum in a majority of less developed countries, above 3 per cent in many, and close to 4 per cent in a few. In the 1960s, a number of less developed countries embarked upon a trend of decreasing fertility whereby their population growth rates have been appreciably moderated Mauritius is one of these; statistics of other less developed countries where substantial declines of birth rates have been reliably recorded are brought together in table 5. Most of these are relatively small countries which do not have much weight in the population trends of the regions to which they belong. Precise measures are lacking for some other countries where the birth rates appear to have decreased considerably since 1960, including Chile, Cuba, Egypt and the Republic of Korea

17. The recent declines of fertility in less developed countries, like those of mortality, have been much more rapid than those which the more developed count[illegible] experienced in the past. The unweighted average of the annual birth rates of the less developed countries or areas listed in table 5 dropped from 39.3 in 1960-1964 to 29.1 in 1970, a larger decrease than was recorded in Sweden during the 40 years from 1873-1877 to 1913-1917. The decline during the 1960s in some of the less developed countries may have been due in part to cyclical factors like those which were operating in the Western industrialized countries. The record of the birth rates in Mauritius (table 4) exhibits a down-swing in the 1930s, an upswing in the 1940s and early 1950s, and a sustained down-swing thereafter, paralleling somewhat the simultaneous trends in Western industrialized countries, save that in Mauritius the level of the rates in 1970 and 1971 is considerably below that of the 1930s. Similar forms of the trends can be seen in the statistics of a number of other less developed countries, particularly in the Caribbean and South-East Asia regions It may also be significant that the pace of the declines seems to have slackened during the most recent years in the countries listed in table 5. Nevertheless, there are some grounds in the statistical records to date for expecting that these less developed countries will complete the transition to low levels of fertility in less

TABLE 5. VITAL INDEXES OF LESS DEVELOPED COUNTRIES OR AREAS WHERE SUBSTANTIAL DECREASES OF FERTILITY HAVE BEEN RELIABLY RECORDED SINCE 1960

Country or area	*Annual birth rates per 1,000 population*				*Annual rates of natural increase per 1,000 population*			
	1960-1964	*1965-1969*	*1970*	*1971*	*1960-1964*	*1965-1969*	*1970*	*1971*
Mauritius	38.9	31.8	26.0	25.2[a]	29.3	23.2	18.2	17.7[a]
Réunion	43.8	38.7	30.2	31.7	32.7	29.4	21.9	24.0
Tunisia	46.2	40.9	36.2	34.8	35.1	30.4	27.3	25.5
Costa Rica	46.1	38.2	33.2	31.6	37.6	30.8	26.6[a]	25.7
Guadeloupe	36.3	32.5	28.8	30.3[a]	27.9	24.6	21.1	23.3[a]
Jamaica	39.9	36.6	34.4	34.8[a]	31.3[a]	29.1	27.1	27.2[a]
Martinique	35.3	31.0	27.5	27.1[a]	26.8	23.6	19.9	20.6
Trinidad and Tobago	37.1	28.6	24.3	23.9	29.6	21.8	17.5	17.2
Hong Kong	34.5	24.7	20.0	19.0	28.6	19.5	14.9	14.0
Singapore	35.6	26.9	23.0	22.8[a]	29.7	21.7	17.8	17.4[a]
Sri Lanka	35.1	32.11	29.4	29.9	26.6	24.6	21.9	22.4
West Malaysia	39.2	32.9	29.9	—	30.2	25.3	22.6[a]	—
American Samoa	42.2	36.6	34.6	35.8	36.5	31.4	29.2	30.9
Fiji	39.2	32.9	29.9	30.3	34.2	27.9[b]	25.2[b]	24.4

SOURCE: For gross reproduction rates, *Population Index*, vol. 39, No. 2 (April 1973), pp. 285-292. For annual birth and natural increase rates, United Nations, *Demographic Yearbook*, various issues.

[a] Provisional.

[b] Recorded rates. Slightly lower rates are indicated by the death rate for 1966-1970 estimated by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

time than it required in the countries which are now more developed.[13]

18. The population projections for less developed regions are predicated on the assumption that the decreasing trend of fertility will become general in those parts of the world during the next three decades, as shown by the projected gross reproduction rates in table 6. How soon such a trend will begin in countries where it is not yet evident and how quickly fertility will come down in each country once the trend has begun may depend to a great extent upon the progress of social and economic development and upon cultural factors as well as national population policies. The assumed future trends of fertility are the most important and most uncertain elements in population projections. Gross reproduction rates are expected to decline soon after 1975 in all regions except Middle Africa, where this may occur somewhat later; and Eastern Europe and Japan, where the level is already at 1.0. However, the speed of the decline will vary widely from one region to another; and even by the end of the century the levels will still be far apart, ranging from 2.4 in Middle Africa to 0.9 in three of the more developed regions.

19. The negative effects of the projected decreases in fertility upon population growth rates in the less developed regions are expected to be partially offset by positive effects due to diminishing mortality. On the assumption of progressive economic development, rising incomes, improved diets and other material conditions of life, and advancing medical and health services, large gains in expectation of life are projected between 1970 and 2000 in all the less developed regions, as is also shown in table 6. By the turn of the century, it is assumed that the expectation will exceed 70 years in China and in other East Asia, all regions of Latin America, and in Polynesia and Micronesia. In Western, Eastern and Middle Africa, where the current conditions of mortality are least favourable, increases of average life expectation from about 40 years in 1965-1970 to the range of 54-57 years in 1995-2000 are projected.

20. In the more developed regions, no great changes in fertility or mortality up to the end of the present century are foreseen in the projections, except for Temperate South America, where the current average expectation of life is relatively low and the average gross reproduction rate is relatively high, mainly on account of the inclusion in this region of Chile, a somewhat less developed country. The average vital indexes of Temperate South America are expected to draw nearer to those of other regions considered to be more developed. With this exception, gains of from only two to four years in the regional average expectations of life are projected between 1965-1970 and 1995-2000. It would be difficult for the already high levels of life expectation in the more developed countries to rise any higher without major new discoveries in the medical and life sciences which might have the effect of greatly retarding the processes of senescence and prolonging life in old age. Even if this were accomplished, it would not have a very great influence on the growth of population in more developed regions during the period of the projections. As already mentioned, it is the saving of reproductive potential by increasing

[13] Additional evidence to support this expectation is set forth by Dudley Kirk, "A new demographic transition?", in National Academy of Sciences, *Rapid Population Growth Consequences and Policy Implications* (Baltimore and London, Johns Hopkins Press, 1971), pp. 131-138.

TABLE 6 EXPECTATION OF LIFE AND GROSS REPRODUCTION RATES FOR REGIONS OF THE WORLD ESTIMATES FOR 1950-1955 AND 1965-1970 AND PROJECTIONS FOR 1980-1985 AND 1995-2000

Region	*Expectation of life at birth (years)*				*Gross reproduction rates*		
	1950-1955	*1965-1970*	*1980-1985*	*1995-2000*	*1965-1970*	*1980-1985*	*1995-2000*
World total	47 0	55 0	62 0	66 0	2 2	1 9	1 5
More developed regions, total	64 6	70 4	73 3	73 5	1 2	1 0	1 0
Western Europe	67 6	71 4	73.2	74 9	1 1	0 9	0 9
Northern Europe	69 4	71.9	73 6	74 8	1 1	1 0	1 0
Southern Europe	63 3	69 8	72 1	73 3	1 2	1 1	1 0
Eastern Europe	63 2	69 6	71 4	73 6	1 0	1 0	1 0
USSR	61 7	70 3	71 5	73 0	1 2	1 1	1 1
Japan	61 9	70 9	74 6	74 8	1.0	1 0	1 0
Northern America	68 7	70 5	72 0	72 5	1 1	0 9	0 9
Temperate South America	61 4	65 6	69 8	71 7	1 6	1.3	1 0
Australia and New Zealand	69 6	71 8	73.1	73 9	1 4	1 1	0 9
Less developed regions, total	42 0	51 0	58 0	64 0	2 7	2 2	1 6
China	45 0	58 0	66 0	71 0	2 0	1.4	1 1
Other East Asia	50 0	59 0	65 0	70 0	2 3	1 7	1 3
South-East Asia	42 0	49 0	55 0	62 0	3 0	2 7	1 7
Middle South Asia	40 0	47 0	54 0	61 0	3 0	2 7	1 8
South-West Asia	44 0	51 0	59 0	64 0	3 1	2 8	1 9
Northern Africa	43 0	49 0	56 0	62 0	3 1	2 8	2 0
Western Africa	33 0	39 0	46 0	54 0	3 2	3 1	2 3
Eastern Africa	36 0	42 0	50 0	57 0	3 2	3 1	2 2
Middle Africa	37 0	41 0	47 0	54 0	2 9	2 9	2 4
Southern Africa	43 0	48 0	56 0	62 0	2 8	2 6	1 9
Tropical South America	53 0	59 0	65 0	71 0	2 7	2 1	1 4
Middle America, mainland	50 0	60 0	66 0	70 0	3 1	2 6	1 9
Caribbean	52 0	61 0	67 0	70 0	2 4	1 9	1 4
Melanesia	40 0	46 0	54 0	61 0	3 1	2 8	2 0
Polynesia and Micronesia	45 0	60 0	67 0	71 0	2 5	1 8	1 3

SOURCE Population estimates and projections available to the United Nations as of March 1974

probabilities of survival to and through the ages of reproduction which is most important in this connexion There is little scope for futher progress along this line in situations where more than 90 per cent of each generation already live to the age of 50

21. As concerns the trends of fertility, upon which the future growth of population in more developed regions will chiefly depend, a further decrease in their average gross reproduction rate is projected, from 1.2 in 1965-1970 to 1.0 in 1995-2000, with only small variations among individual regions about this eventual average. It should be understood that these assumptions refer to long-range future trends without regard for the likelihood of oscillations of the kind experienced in the Western industrialized countries since the 1930s The gross reproduction rates projected for 1995-2000 in more developed regions range from 1.1 in the USSR to 0 9 in Western Europe, Northern America and Australia and New Zealand, whereas the replacement levels corresponding to the projected conditions of mortality would be about 1 03 or less. Thus, according to the assumptions of these projections, the long-term equilibrium of fertility and mortality postulated by the theory of the demographic transition (in some of its versions) might soon come generally into effect in all the currently more developed regions and possibly in East Asia also Even so, population would still grow in these regions at a moderate rate because birth rates would continue to exceed death rates to some extent, pending an eventual stabilization of the population age structures.

PROSPECTS OF STABILIZING POPULATION

22 "The ultimate goal of the world's population policy", it has been said, "must be to achieve an equilibrium based on low birth and death rates that can be sustained throughout a distant future for the world and its several parts."[14] Of course, this is not the only way in which the current episode of expanding population might be brought to an end. One alternative would be retrogression to higher levels of mortality, or catastrophic depopulation, but all humanity will certainly join in hoping for a better fate. Another possibility, already mentioned, is that fertility might continue to decline below the level of replacement so that an era of decreasing population would ensue. But before depopulation went so far as to create any serious difficulties for the functioning of the economy and the

[14] Frank W Notestein, "Population policy and development: a summary view", *Population Debate*, vol I, part four, para 5.

TABLE 7. LONG-RANGE POPULATION PROJECTIONS FOR THE WORLD AND MAJOR REGIONS ACCORDING TO ASSUMPTION OF EVENTUAL STABLE EQUILIBRIUM OF FERTILITY AND MORTALITY

Region	Date of achievement of stated conditions (year)		Population (millions)		
	Net reproduction rate of 1.00	Annual percentage growth rate of zero	1970	2000	2100
World total	2070	2140	3,621	6,407	12,257
More developed regions	2020	2070	1,084	1,368	1,570
Europe	2005	2065	459	540	589
USSR	2015	2085	243	321	399
Northern America	2000	2060	226	296	339
Oceania	2020	2085	19	33	52
Less developed regions	2070	2140	2,537	5,039	10,687
Africa	2070	2140	352	834	2,435
East Asia	2010	2080	926	1,373	1,776
South Asia	2060	2120	1,111	2,384	5,358
Latin America	2035	2105	284	625	1,308

SOURCE: Population projections available to the United Nations as of March 1974.

social organization, the decreasing trend would surely be checked by pro-natalist pressures.[15]

23. The United Nations Secretariat has supplemented the projections to 2000 with additional speculative, longer range projections in order to illustrate a possible path to global demographic equilibrium. It was assumed for this purpose that the transitions of mortality and fertility would continue in the next century until the two would come into a low-level balance in each region of the world. The results of these long-range projections are summed up briefly in table 7.[16] It will be noted that they show the population in each region continuing to increase for many years after fertility is assumed to reach the replacement level (i.e., net reproduction rate of 1.00). In the East Asian region, for example, the population increases by 272 million between the year 2010, when the replacement level of fertility is reached, and 2080, when the growth ceases. The reason for this is the tendency to perpetuate growth inherent in the age structures of growing populations, which has kept birth rates above death rates during recent years in countries where fertility has dropped below the level of replacement.

24. The picture that appears in these projections, of a future world with more than three times the current population, will certainly not satisfy those who are convinced that there are already more than enough human beings on this planet, and raises questions about the limits of man's demands upon the earth's resources. Even at current levels, there is widespread anxiety about the consequences of continually increasing population in the context of the intransigent problems of poverty and underemployment in less developed countries; and pollution, congestion, and energy shortages in more developed countries. The convening of the World Population Conference, 1974, and the formulation of the World Population Plan of Action reflect the increasing intensity of these concerns.

25. The decline of fertility during the 1960s in many of the more developed countries and the fact that it has now fallen below the replacement level in some of them suggests that the demand for "zero population growth" may be nearly satisfied before the next century has advanced very far. While this is quite possible, there is also the possibility that the recent decreases of fertility may prove to be temporary. It should not be forgotten that fertility fell below the replacement level during the 1930s in a number of these same countries and revived vigorously afterwards. It is important also to take account of the impetus to continuing growth that comes from the population structure. A projection of the total population in the more developed regions from 1970, assuming average fertility to drop immediately to the level of replacement, indicates a 27 per cent increase during the next 80 years, before stabilization of the age structures in forms that would equilibrate the birth and death rates.[17] Instant achievement of zero population growth would require reducing fertility temporarily more or less far below the replacement levels and this would pose difficult problems of future adjustments for many countries if the aim were to hold the population constant at the current number. For example, in the Netherlands, where fertility in 1968 was about 30 per cent above replacement,[18] it would have had to be reduced by more than one half, to 40 per cent below replacement level, in order to balance births and deaths immediately.[19]

[15] Yaropolk N. Guzevatyi, "Economic and social determinants of contemporary demographic behaviour", *Population Debate*, vol. I, part four.

[16] For details, including variants of the projections with different assumptions as to the dates when replacement levels of fertility would be reached in the different regions, see United Nations Secretariat, "World and regional population prospects", *Population Debate*, vol. I, part two.

[17] Tomas Frejka, *The Future of Population Growth: Alternate Paths to Equilibrium* (New York, Wiley, 1973), p. 72.

[18] Net reproduction rate of 1.29 as shown in *Population Index*, vol. 39, No. 2 (April 1973), p. 291.

[19] T. Frejka, *op. cit.*, p. 158.

The country would then have faced the problem of reversing the trend and bringing fertility back up to the replacement level within the next few decades unless depopulation at a progressively accelerating rate were accepted

26. The difficulty of bringing population growth to an early halt is all the more evident in the typical circumstances of less developed countries, where the gap between current fertility and the level of replacement is generally much wider and where, moreover, the replacement level is continually being lowered by the ongoing trend of decreasing mortality. The inertia of rapid growth that is inherent in these conditions is illustrated by a projection beginning from the demographic situation of Northern Africa in 1965 and assuming a rapid transition to a low-level balance of fertility and mortality to be achieved by 2000 (gross reproduction rate falling from 3.2 to 1.1 and life expectation at birth rising from 50 to 70 years during the 35-year interval). This projection shows the population nearly tripling (from 75 million to 222 million) before it becomes stationary about the year 2075.[20] A projection for India calculated to show what would be required to bring the population to a stationary state by the year 2000 calls for the average number of births per woman of completed fertility (i e , the total fertility rate) to decrease from an estimate of 5 5 in 1965-1970 to 1.1 in 2005-2010 The net reproduction rate would then be down to 0 5 and when the shrunken generations born during the early decades of the twenty-first century reached the age of parenthood, they would have to triple fertility to keep the birth rate up with the death rate The price of stability in size of the population would be an abnormal instability in its structure and vital processes. Alternately expanding and contracting numbers of school-age children and young people coming of age to seek employment, to marry and to establish new households would have unsettling effects on the educational system, the labour market and the economy.[21] It is hardly likely that a Government would pursue such a population policy even if it could be made effective.

27 In short, barring reversal of the mortality trends, it appears almost inevitable that population will continue to increase for a long time yet, especially in the less developed regions. Meanwhile, the community of nations will continue to face the double problem of satisfying the wants of ever larger numbers of people, concentrated more and more preponderantly in parts of the world where the need to raise levels of consumption *per capita* is most pressing, while, at the same time, conserving the earth's vital resources in a durably viable ecosystem The alternatives which depend upon the control of fertility lie between massive and more massive growth continuing indefinitely

PATHS OF TRANSITION FROM HIGH TO LOW FERTILITY

28. One may ask in what way and under what conditions fertility may be reduced in the less developed countries where it has hitherto remained high The experiences of more developed countries that have undergone the transition to low fertility provide clues, although no precise formulae for predictions To summarize the principal lessons of those experiences, *one begins with the ways in which the transition has* come about The questions of its causes and favourable or necessary conditions for its occurrence are taken up in the next section

29. It should be pointed out in the first place that it is by the free will and determined action of the people that fertility has been reduced to a fraction of its former levels in all countries of advanced social and economic development They have suffered no loss of ability to generate offspring; on the contrary, although satisfactory measures are lacking, there is reason for believing that the physiological capacity to reproduce has increased with the progress of modern social and economic development, through improved health and nutrition These factors are believed to have made for diminishing prevalence of sterility and subfecundity (i e , incapacity and subnormal capacity of women to conceive, due to conditions of their own bodies or those of their mates) and diminishing rates of spontaneous abortion and stillbirth.[22] The involuntary loss of fecundity due to protracted nursing of infants at the breast—formerly a widespread practice in some of the countries that are now highly developed and still widespread in many less developed countries—has also diminished with increasing use of animals' milk and commercial food for babies. The influence of these factors tending to enhance reproductive capacity has been far over-balanced, in the countries of low fertility, by deliberate control of births, chiefly by means of contraception and induced abortion Where the transition to a régime of controlled, low-level fertility took place early, it was strictly a spontaneous popular movement, not encouraged or facilitated by the Governments, churches or other authorities Indeed, in many cases, it was contrary to government policies and religious precepts.

30 In countries in early stages of development, where there is little deliberate limitation of births, fertility may tend to rise as a result of improving health and nutrition and obsolescence of traditional modes of behaviour which inhibit fertility [23] This is one possible

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[20] G A Pavlov, "The interrelationships between development and population in the developing countries", *Population Debate*, vol I, part four, para 21

[21] T. Frejka, *op cit*, pp 159-160 See also J Bourgeois-Pichat and S A Taleb, "Un taux d'accroissement nul pour les pays en voie de développement en l'an 2000 Rêve ou réalité?", *Population* (September-October 1970)

[22] [illegible] (Uni[illegible] chap [illegible] a ter[illegible] in th[illegible] a great effect on reproductive performance

[23] Richard A. Easterlin, "The effect of modernization on family reproductive behaviour", *Population Debate*, vol II, part six, paras 35-37.

explanation for historical indications of rising birth rates in parts of Europe during the early days of the Industrial Revolution and for the upward movements recorded recently in a number of less developed countries. In parts of Africa and the Caribbean region, where venereal diseases are regarded as responsible for very high rates of sterility, eradication of these diseases could have a strong positive effect on the trend of fertility in the future. It is estimated that in certain Caribbean and tropical African countries, out of the 30 years of women's potentially fertile life between the ages of 15 and 45, 16 or 17 years may be lost on account of sterility, on average. The corresponding estimate for Asian and North African countries is a loss of eight or nine years.[24]

31. The voluntary restriction of births in countries of low fertility is not primarily a rejection of parenthood, although some couples do elect to remain childless. What the modern generations in these countries have rejected almost unanimously is the responsibility of a large family. Instead of five, six, seven or more children, a great majority are content with one, two or three. In Norway, for example, the parity distribution of marriages of completed fertility in which the wife was married at age 25 changed as follows during half a century of declining fertility:

Number of live-born children	*1876-1885*	*1900*	*1950*
None	4.1	4.6	7.1
1	3.3	4.6	18.9
2	3.9	8.0	29.2
3	6.5	10.2	19.9
4	7.2	11.8	11.7
5	9.3	11.1	6.3
6	11.5	11.7	3.0
7 or more	54.2	38.0	3.9
	100.0	100.0	100.0
Average	6.5	5.5	2.7

SOURCE: Louis Henry, "La population de la Norvège depuis deux siècles", *Population*, vol. 25 (1970), p. 552.

32. In the United States of America, among the survivors of women born during 1835-1839 who were enumerated at the 1910 census, 7.9 per cent of those ever married had borne no children, 17.5 per cent had borne one or two and 54.3 per cent five or more. The corresponding figures for women born during 1905-1909 and enumerated in 1960 were 20.0 per cent having borne no children, 44.7 per cent one or two and 12.4 per cent five or more.[25] Similar changes have taken place in other countries in transition from high to low fertility.[26]

33. It is by ceasing to bear children at progressively shorter durations of marriage that the size of families has been reduced, rather than by delaying the start of childbearing after marriage or spacing births at wider intervals.[27] The modal behaviour of couples in low-fertility countries is to complete their families in the first 10 years of marriage or sooner. On average, three fifths of total fertility in countries with gross reproduction rates below two results from births to women between 20 and 29 years of age, whereas this proportion in high-fertility countries is less than one half.[28]

34. Postponement of marriage and increasing celibacy, in addition to the limitation of births within marriage, have contributed to the decline of fertility in some populations, including those of the USSR and Japan, and recently some others in Asia. Coale has devised indexes to measure the contributions of varying prevalence of marriage and varying marital fertility rates to levels and changes of fertility.[29] In the examples of the European USSR and Japan shown below, the index of over-all fertility (I_f) is the ratio of actual fertility to a hypothetical maximum which would result from all women being married between ages 15 and 50, and bearing children at the age-specific marital fertility rates of the Hutterites, which are among the highest on record. The index of marital fertility (I_g) is the ratio between the actual level of marital fertility rates in the given population and that of the Hutterites, while the index of the proportion married (I_m) is a weighted average of this proportion among age groups of the female population between 15 and 50 years, with the Hutterite marital fertility rates as the weights. Thus, if illegitimate fertility is negligible, I_f equals the product of $I_g \times I_m$.[30]

	I_f	I_g	I_m
European USSR:			
1900	.55	.77	.70
1930	.42	.65	.63
1960	.24	.35	.62
Japan:			
1930	.37	.51	.68
1960	.17	.29	.58

[24] Estimates derived from the results of calculations by Jean Bourgeois-Pichat, "Les facteurs de la fécondité non-dirigée", *Population*, vol. 20 (1965), pp. 383-424. Bourgeois-Pichat's estimates of sterility rates may be exaggerated as a result of faults in the data and error in the assumption that all women who ceased to bear children at each parity were sterile thence forward.

[25] Irene B. Taeuber, "Change and transition in family structures", in Arthur A. Campbell and others, eds., *The Family in Transition*, Fogarty International Center Proceedings No. 3 (Washington, D.C., Government Printing Office, 1971), pp. 51, 56-59 and table 1.

[26] References to some relevant studies are given in *The Determinants and Consequences of Population Trends*, chap. IV, paras. 12-13.

[27] Norman B. Ryder, "Fertility", in Philip M. Hauser and Otis Dudley Duncan, eds., *The Study of Population: An Inventory and Appraisal* (Chicago, Illinois, University of Chicago Press, 1959), p. 410.

[28] *The Determinants and Consequences of Population Trends*, chap. IV, para. 15.

[29] Ansley J. Coale, "Factors associated with the development of low fertility: a historic summary", in *Proceedings of the World Population Conference, 1965*, vol. II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No. 66.XIII.6), pp. 205-209.

[30] It should be noted that the validity of I_g and I_m as measures of the effects of variations in marriage and marriage fertility depends upon the assumption that these factors are independent of each other. Actually, where marital fertility is

35 The changes of I_m imply that decreasing prevalence of marriage could account for an important part of the decline of fertility in European USSR between 1900 and 1930, and in Japan between 1930 and 1960, although decreasing marital fertility was the more important factor in both cases. I_m measures the net effect of all factors bearing on the proportions of married women in age groups of the female population between 15 and 50, including celibacy, widowhood and divorce, as well as the age at marriage, but the principal change in these examples was rising age at marriage In Japan, the proportion ever married among females in ages 15-19 fell from 17.7 per cent in 1920 to 1 8 per cent in 1955, while the proportion among those in ages 20-24 dropped from 68 6 to 33 9 per cent.[31]

36 Delay of marriage has played a more important part in recent fertility declines in some less developed countries or areas of Asia In Singapore, a drop of about 35 per cent in fertility between 1957 and 1966 was due in nearly equal shares to decreasing prevalence of marriage and decreasing marital fertility (on the assumption of independence between the two, which probably somewhat exaggerates the effect of the marriage factor) [32] The diminishing propensity to marry early has been important also in recent fertility declines in Sri Lanka, Hong Kong and the Republic of Korea

37. It has been suggested as a general rule that both the prevalence of marriage and marital fertility are likely to decrease in the course of modernization of traditional societies which are characterized at first both by high marital fertility and by very early and universal marriage, and that both of these factors are likely to play important parts in the transition to low fertility in such circumstances.[33] These circumstances are currently typical of high-fertility less developed countries in Africa and Asia, but not in Latin America. The regional differences in prevalence of marriage are indicated by the following values of I_m corresponding to typical nuptiality patterns of African, Asian and Latin American populations:

	I_m
Africa south of the Sahara	89
North Africa	77
Asia	.81
Latin America	62

Source. Indexes [illegible] from data [illegible] by Jean Bourgeois [illegible]
censuses, I_m for Latin America may be understated

38. In the countries of western Europe, customs of relatively late marriage and high rates of celibacy became established several centuries before the start of modern social and economic development. On that account, the western European countries entered the modern era with relatively moderate over-all fertility in spite of high marital fertility rates. They made the transition to low fertility by curbing marital fertility with little change, on the whole, in the prevalence of marriage up to the 1930s, as illustrated by the examples given in table 8 The mode of the transition was similar in Northern America, Australia and New Zealand although marriage was not as late and celibacy not as frequent there as in western Europe [34]

39. The 1940s and 1950s witnessed a remarkable upsurge of marriage throughout Europe and in Northern America, Australia and New Zealand Women's average age at first marriage dropped as much as two or three

to a great extent deliberately controlled, there is reason for supposing that variations in age at marriage would tend to be compensated at least in part by variations in age-specific marital fertility rates so as to produce families of the desired size

[31] Kingsley Davis, "The theory of change and response in modern demographic history", *Population Index*, vol 29 (1963), p 348

[32] Ansley J Coale, "The demographic transition", *Population Debate*, vol I, part two, para 48

[33] *Ibid*

[34] Ansley J Coale, "Factors associated with the development of low fertility .. ", *loc. cit*, para 30

TABLE 8 INDEXES OF FERTILITY AND MARRIAGE FOR SELECTED COUNTRIES, 1870-1960

	Index of over-all fertility (I_f)				*Index of marital fertility (I_g)*				*Index of proportion married (I_m)*			
Country	*1870*	*1900*	*1930*	*1960*	*1870*	*1900*	*1930*	*1960*	*1870*	*1900*	*1930*	*1960*
Sweden	0.33	0.30	0.15	0.17	0.71	0.64	0.30	0.24	0.42	0.41	0.42	0.63
England and Wales	0.37	0.27	0.15	0.22	0.68	0.54	0.29	0.29	0.51	0.48	0.50	0.71
Ireland	0.29	0.23	0.24	0.29	0.67	0.74	0.66	0.60	0.42	0.31	0.35	0.47
France	0.28	0.24	0.19	0.22	0.48	0.38	0.30	0.31	0.54	0.57	0.58	0.67
Portugal	0.34[a]	0.35	0.30	0.26	0.64	0.68	0.54	0.41	0.45[a]	0.46	0.47	0.56
Bulgaria		*0.52*	*0.31*	*0.20*		*0.70*	*0.41*	*0.24*		*0.73*	*0.75*	*0.78*
European USSR		0.55	0.42	0.24		0.77	0.65	0.35		0.70	0.63	0.62
Japan			0.37	0.17			0.51	0.29			0.68	0.58
United States of America	0.37	0.29	0.20	0.28		0.49	0.31	0.36		0.58	0.63	0.75
Australia		0.29	0.19	0.28		0.58	0.33	0.38		0.47	0.54	0.71

SOURCE. Ansley J Coale, "Factors associated with the development of low fertility a historic summary", in *Proceedings of the World Population Conference, 1965*, vol II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No 66.XIII.6), p 209; Massimo Livi Bacci, *A Century of Portuguese Fertility* (Princeton, New Jersey, Princeton University Press, 1971), p 56

[a] 1878

Figure II. The impact of sex and age structure, nuptiality and marital fertility on crude birth rates, 1961-1972

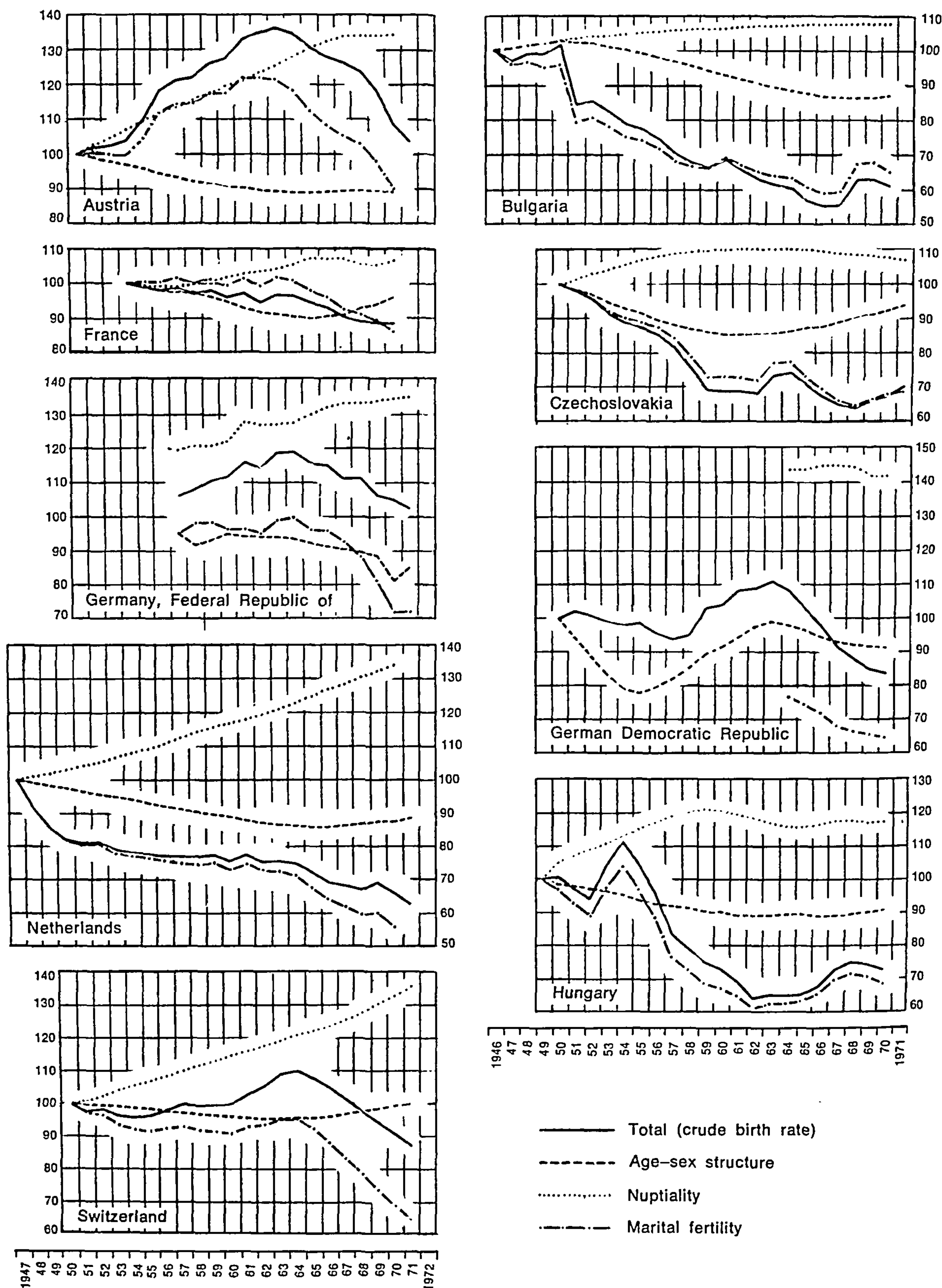
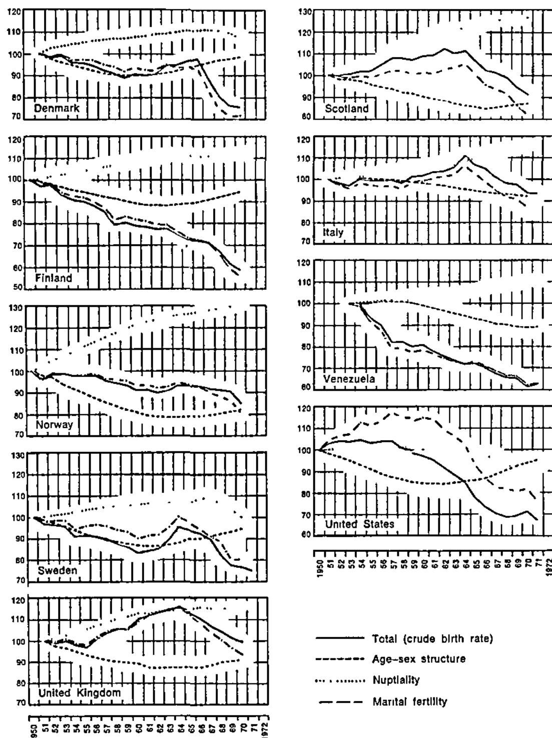


Figure II
(continued)



SOURCE United Nations Secretariat, "Recent demographic trends in Europe and the outlook until the year 2000", *Population Debate*, vol I, part two

years in most of the northern and western European countries, Canada, the United States, Australia and New Zealand Smaller decreases in age at marriage were recorded in the USSR and most of the eastern European countries, the only exceptions were Bulgaria and Yugoslavia, where the averages were already very low The increase of familism was marked also by generally decreasing trends in the proportions of women ning

permanently unmarried and of childless marriages. The average number of children born to couples having one or more also increased substantially in Canada, the United States, Australia and New Zealand; but not, in general, in the European countries. On the contrary, the average birth order decreased considerably during the 1950s in a number of countries especially in eastern and southern Europe, continuing the earlier long-range trend towards smaller families.[35]

40. In the countries where marital fertility rose during the 1940s and 1950s, the increase was temporary; the trend turned generally downward again in the 1960s. The increase in prevalence of marriage in Europe, Northern America, Australia and New Zealand appears, however, to be a lasting change. If fertility approximating the replacement level is to be the rule of the future, the trends of the 1960s in low-fertility countries suggest that this can be achieved with nearly everyone marrying and each couple having, on average, two children. However, individual couples may vary in this respect, and there is the continuing likelihood of fluctuations in the course of time in response to economic and social circumstances which cannot now be foreseen.

Factors of declining fertility in the processes of development and modernization

41. *In spite of differences of opinion about the* specific causes of the movement to control fertility at a low level and the conditions which may be necessary for it to get under way, it is generally agreed that progress in social and economic development and associated processes of modernization are highly conducive to this movement. Indeed, the transition to low levels of both fertility and mortality may be regarded as part and parcel of the "transformation in economic, social, and political organization and in human personality" that is called modernization;[36] and it is questionable how far modernization could progress without these demographic transitions. The report of the Symposium on Population and Development, held at Cairo, 4-14 June 1973, declares, "There is every reason to believe that the modernization of the currently developing countries will eventually lead to sustained fertility decline",[37] pointing out that this has been the course of events in varied cultural settings, in sparsely as well as densely populated countries, under socialist as well as non-socialist Governments.

42. The decrease of infant and child mortality rates in the process of modernization is commonly considered a strong inducement to lower fertility. As the chances that children will survive improve, it is argued, it takes fewer births to satisfy parents' desires for living offspring; and if fertility is not reduced, the growing numbers of surviving children add to the burden of dependency on family bread-winners and may cause difficulty in providing inheritance for sons and dowries for daughters.[38] According to one view, a major decrease of infant and child mortality alone may be enough to bring about a decline of fertility, largely independent of the progress of modernization in other respects.[39] To account for the observation that high fertility often persists for some time after infant and child mortality rates have been greatly reduced, as is currently the case in many less developed countries, it is argued that it takes time for the change in probability of children's survival to be perceived and for reproductive behaviour to be adapted to the changed circumstances. It has been demonstrated, though, that the burden of dependency on family bread-winners is not necessarily much increased by a sharp reduction of mortality rates with fertility remaining on a high level, and that the conditions of family structure are likely to be much improved in other respects, as the frequencies of orphanhood and widowhood are diminished.[40]

43. Among other features of modernization commonly regarded as facilitating if not causing a decline in fertility are industrialization and urbanization, increasing school attendance and rising level of popular education, the diminishing role of the family in production, the attenuation of the extended family, emancipation of women and their increasing participation in paid employment and other activities outside the sphere of home and family. These factors are seen as adding to the cost of raising children and taking away from the benefits in contributions of children's earnings to family income and support for the parents in old age. The number of children that parents feel they can afford tends to diminish also as a result of rising standards and aspirations for family levels of living and children's education. Thus, the changes in technology and administrative organization of production in the process of modern economic growth, which heighten the demand for educational qualifications in the labour force,

[35] Measures of the trends in marriage and aspects of marital fertility between 1950 and 1970 in European countries and the USSR are given in United Nations Secretariat, "Recent demographic trends in Europe and the outlook until the year 2000", *Population Debate*, vol. I, part two, tables 5-10 and figures II and III. For the United States of America, see I. Taeuber, *loc. cit.*, table 1.

[36] R. A. Easterlin, *loc. cit.*, para. 2. Essentially the same view is stated by I. Taeuber, *loc. cit.*, p. 87.

[37] "Report of the Symposium on Population and Development", *Population Debate*, vol. II, annex I, para. 31. Findings of studies relevant to the factors of fertility decline are summed up in *The Determinants and Consequences of Population Trends*, chap. IV, paras. 78-135. The relations of declining fertility with various aspects of socio-economic development and modernization are examined in a number of the papers contributed by expert participants in the Symposium on Population and Development, and the Symposium on Population and the Family, Honolulu, 6-15 August 1973.

[38] The question of pressures on the family due to decreased mortality rates is examined by I. Taeuber, *loc. cit.*, pp. 44-48.

[39] H. Frederiksen, "Dynamic equilibrium of economic and demographic transition", *Economic Development and Cultural Change*, vol. 14 (1966), pp. 316-322.

[40] Norman B. Ryder, "Reproductive behaviour and the family life cycle", *Population Debate*, vol. II, part six, paras. 45-51.

help to provide motivation for restricting the size of families [41]

44 The modernization of the mental outlook is also regarded as a major factor in increasing disposition to limit births Especially important in this respect are the awakening of ambition in an individual to improve his lot and that of his children and belief in the possibility of doing so by individual effort and prudence. Openness to new experience and new ways of doing things and the assertion of independence from traditional authorities are other features of the mental make-up of "modern man" that are conducive to the control of fertility [42] Such ideas and attitudes may be fostered by education, by the breakdown of traditional systems of social stratification, and possibly by increasing expectation of life.

45 History has shown, however, that a high degree of socio-economic development and modernization in other respects are not indispensable conditions for the reduction of fertility In Bulgaria, for example, when the decline of fertility began, about 1910, more than 80 per cent of the population were rural, 70 per cent of the male labour force were employed in agriculture, 60 per cent of the adult population were illiterate and the infant mortality rate was above 150 per 1,000 [43] France was even less advanced in industrialization, urbanization and education when fertility in that country entered its long downward trend around the end of the eighteenth century. One may surmise that the French Revolution and the changes in social and political organization, the new ideas and attitudes which flowed from it, had much to do with the early beginning of the fertility transition in France Among other parts of Europe where the transition began earliest were sections of Austria-Hungary where the population was almost wholly rural and agricultural, largely illiterate and far from being either very healthy or wealthy when fertility began to decline. [44]

46. It is equally apparent, on the other hand, that *socio-economic development and modernization may advance rather far before the buttresses of high fertility* yield. In England and Wales, when the inception of the fertility decline became clearly visible, about 1890, the population was already more than 70 per cent urban, over 80 per cent of the male labour force were in non-agricultural employment and literacy was nearly universal among the younger generations Venezuela is a current example of high fertility persisting in a country which has achieved relatively high levels of expectation of life, urbanization, non-agricultural share in employment and some other indexes of development and modernization

47 In short, there is no reliable general formula for predicting the onset of the fertility transition in terms of *levels and changes of such statistical indicators of modernization and development* If there is some threshold level of advancement in these respects, where conditions are ripe for the decline of fertility, evidently the threshold is not the same in all countries and periods The results of historical studies imply that features of culture related to language and religion have been important in the reactions of fertility to economic and social change The basis for predictions may be improved by current research into associations between socio-economic indicators and fertility levels and trends within regional groups of less developed countries which are relatively homogeneous in culture. [45]

48. The report of the Symposium on Population and Development lists three essential conditions for a major reduction in *marital fertility*. "(*a*) the regulation of fertility after weighing advantages and disadvantages of additional births must be an accepted mode of behaviour, (*b*) lower fertility must be perceived by individual couples as advantageous to the parents and children; and (*c*) there must be adequate knowledge and acceptance of effective means of reducing fertility, sufficient skill in the use of such means and ready availability of necessary supplies and services" [46] With [illegible]

strong motivation to limit births In countries where the fertility transition began early, the reductions during the initial stages were accomplished by simple folk methods which had long been known although relatively little practised previously in the societies concerned The continued decline of fertility in these countries and its initiation elsewhere during more recent times cannot be explained mainly as a result of the invention and spreading knowledge of more efficient and convenient means of control. However, the advances in birth-control technology have undoubtedly played a part in speeding the decline of fertility and bringing it to lower levels than would have been reached otherwise Ignorance of reliable methods of control and lack of ready access to supplies and services are still responsible for many unwanted pregnancies in low-fertility countries. [47]

[illegible] theoretical model of determinants of fertility and its changes in terms of economic, demographic, social and psychological variables affecting the motivation of individuals to regulate births

[42] A. Inkeles, "Industrial man the relation of status to experience, perception and value", *American Journal of Sociology*, vol 66 (1960), p 210 (quoted by R A Easterlin, *loc cit*, para 41)

[43] Etienne van de Walle and John Knodel, "Demographic transition and fertility decline the European case", *International* [illegible]

EFFECTS OF GOVERNMENTAL POLICY AND ACTION PROGRAMMES ON FERTILITY TRENDS

49. The family planning programmes which have been organized on a large scale in many less developed countries to provide information, services and supplies, and to indoctrinate the public in the advantages of regulating births are a new and potentially influential factor in fertility trends. There is not yet enough experience with such programmes to demonstrate unequivocally how effective they may be as instruments of population policy. More or less extensive family planning programmes have been operating in all the less developed countries where fertility has decreased substantially in recent times, but it is hard to tell how much of the credit for the decreases is due to these programmes. Assessments of their demographic impact, such as an estimate that 2.3 million births were averted by family planning programmes in less developed countries in 1968, depend upon assumptions that are debatable.[48] Some experts are of the opinion that the countries where fertility declined might have reached the point in their social and economic development where a decline was due anyway. In fact, the birth rates in some of these countries had already begun to drop when the family planning programmes got under way. If it was not the programmes that triggered the declines, they may, nevertheless, have added impetus to the downward trends of fertility; but their effectiveness in this respect also is uncertain.[49]

50. No great changes in fertility have yet been recorded in other less developed countries where family planning programmes have also been in operation on a large scale for some time. India and Pakistan are notable examples. These experiences tend to negate the idea that, as a general rule in less developed regions of the world, it is lack of knowledge and means of effective control which is responsible for high birth rates. Many experts are sceptical about the chances of achieving much success in inducing declines of fertility in poverty-ridden, ill-educated, traditionally minded populations merely by making contraception, sterilization etc. available, when their conditions of life are not favourable to the development of motivation for limiting births. This view was expressed by some of the contributors to the Symposium on Population and Development and the Symposium on Population and the Family.[50] In dissent, one contributor observed that the three essential conditions for a decline of fertility listed in the preceding section could occur in little-modernized populations, as demonstrated by experiences in European history, and concluded: "There is no convincing basis for asserting that a programme of indoctrination in the advantages in health and welfare from reduced fertility would inevitably be a failure in a rural, poorly educated population."[51] Another contributor pointed out that the threshold level of motivation to regulate fertility, where a family planning programme could be effective, is not determined only by the levels of urbanization, education etc.; child mortality and factors of reproductive capacity are of major importance.[52]

51. Even where conditions are not favourable for an immediate, wide response to a family planning programme, such a programme may serve to plant and foster the seeds of modernization in ideas and behaviour related to fertility and so to hasten the eventual transition to low fertility. "It is true that values mediate behaviour", a contributor to the Symposium on Population and Development wrote, "but it is also true that behaviour mediates values, as any observer of fashions in dress must agree. Probably there is no more effective means of communicating the small-family ideal than to support the efforts of those already motivated by making contraception simple, attractive and inexpensive to practise."[53]

52. What action Governments take to alter the social, economic and demographic conditions which relate to motivation for regulating births may be more important than what is done to provide the means. The report of the Symposium on Population and Development recommends:

> "Since high birth rates are usually prevalent primarily among the less privileged sectors of population which maintain the traditional modes of production and social organization, development policies—including population policies—should emphasize fostering socio-economic change in these sectors. Elements of such policies include a balance between agriculture and industry in development planning, sufficient employment opportunities, a more equitable distribution of income, and special concentration on the provision of education and of employment opportunities for women outside the home. Such measures would help to fulfil the basic development objective of social justice and contribute to favourable changes in patterns of demographic behaviour."[54]

In varying degrees, the national development policies and plans of less developed countries are, in fact, focused on these objectives; but it is difficult, if not impossible, to estimate the impact of the various kinds of action taken upon the trends of fertility.

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[48] Organisation for Economic Co-operation and Development, *The Development Centre Report on Population* (Paris, 1969), chap. 4.

[49] Problems and uncertainties in interpretation of the evidence are discussed by Harry M. Raulet, "Family planning and population control in developing countries", *Demography*, vol. 7 (1970), pp. 226-232.

[50] Y. N. Guzevatyi, *loc. cit.*, para. 24; and K. H. Khalil, "The impact of development on population growth" (E/CONF.60/SYM.I/23), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973, pp. 16-17.

[51] A. J. Coale, "The demographic transition", *loc. cit.*, para. 44.

[52] R. A. Easterlin, *loc. cit.*, para. 64.

[53] F. W. Notestein, *loc. cit.*, para. 30.

[54] *Loc. cit.*, para. 75. The importance of income distribution as a factor in the level and trend of fertility is analysed by H. W. Singer, "Income distribution and population growth", *Population Debate*, vol. I, part four.

53. Encouragement of women's employment in paid jobs outside the home is commonly advocated as an especially effective way of providing an incentive for the limitation of births. It is doubtful, however, how much can be accomplished along this line in little developed countries where one of the major problems is scarcity of employment opportunities for either sex, especially in the better paid jobs which would be most attractive as an alternative to motherhood The current movement in some more developed countries against discrimination by sex in employment and remuneration may become an increasingly significant factor tending to lower fertility in future.

54 Discouragement of early marriage is another potentially effective way of lowering birth rates The report of the Symposium on Population and Development refers to this as a generally neglected instrument of population policy.[55] It has been calculated that the birth rate in India might be reduced as much as 30 per cent by 1991-1992 if all women married after the age of 19 years [56] But there is a problem in attempting to achieve a major change in the pattern of age at marriage simply by legislation or decree. It may be difficult to get compliance if the legal age for marriage is set much higher than the currently prevailing mode.

55. Lastly, it should be noted that the population problem may not always be viewed as one of excessive numbers or too rapid growth. In western industrialized countries during the 1930s, it was seen as a threat of depopulation and decadence due to loss of the will to reproduce and there were demands for pro-natalist action by the Governments. The French Government instituted a system of substantial family allowances for workers as a measure of positive population policy among other objectives, although the importance of its actual influence on the trend of fertility is uncertain. In Romania, in 1966, after fertility had fallen more than 10 per cent below the replacement level for several years, the Government moved to tighten restrictions on abortion The effect in this case was immediate and dramatic; the birth rate almost doubled in the following year. If the recent trend of generally decreasing birth rates in other low-fertility countries continues, the policies of their Governments also may shift in pro-natalist directions in spite of concerns about the exhaustion of non-renewable natural resources and the deterioration of the environment

The modernization of mortality

56. Control of disease and premature death is one of the fields of modernization in which the less developed countries have achieved their greatest success during recent decades Mortality rates have been reduced greatly since the Second World War in all the less developed countries where measures of the changes are available, and it is safe to infer that the state of health of their population has also improved greatly, although satisfactory measures of the treatment of sickness and disability are generally lacking Meanwhile, in more developed countries where conditions of health were most favourable and mortality rates were lowest, progress in this sphere has been relatively slow since the war and some reversals have been recorded, showing increasing mortality from some causes in some areas and population groups. So, at least in health and mortality, the relative disadvantage of the "have-not" countries has lessened during the past three decades, although many of them still have a long way to go towards a fully modern régime of health protection and minimal mortality rates.

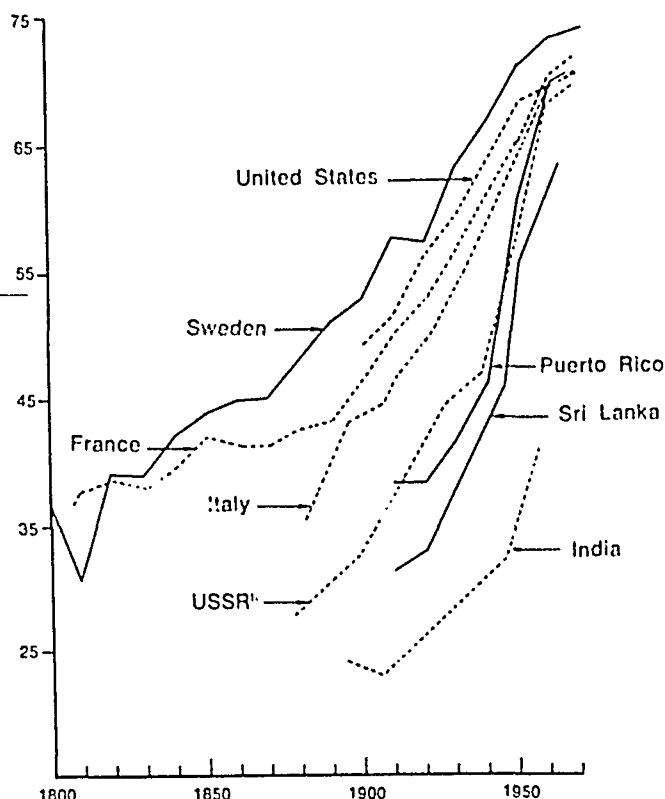
57 Three phases of the trend of declining mortality rates appear to be characteristic of the transition from a pre-modern to a modern mortality régime The first phase is one of slow, unsteady progress from poor to somewhat less poor conditions The greatest gain is made during the second phase, when mortality rates decline rapidly and steadily to a low level Progress is slow again in the final phase, when efforts to push low mortality rates still lower meet increasing difficulties, and a point may be reached beyond which no further gain can be achieved The three phases are clearly visible in the trends of expectation of life at birth in Sweden and France since the beginning of the nineteenth century, charted in figure III In Sweden, one of the world's leaders in expectation of life throughout modern times, the first phase of the transition is represented by the slowly rising trend before 1870, the second by the rapid gains between 1870 and 1950, and the third by the slackening pace of further gains during the 1950s and especially the 1960s In France, the phase of rapid gains began about two decades later than in Sweden and continued one decade longer, the entry of France into the third phase of the transition has been apparent only since about 1960 Of a total gain of approximately 35 years in life expectancy since the early nineteenth century, both in France and in Sweden, more than 25 years were added during the second phase of the transition.

58. The trends in other Scandinavian countries have been similar to those in Sweden. The examples of France and the United States of America charted in figure III are fairly representative of the trends in other countries of north-western Europe and Northern America which have gone through the transition with expectation of life on somewhat lower levels than those of the Scandinavian leaders. The slowing-down of gains since 1950 has been especially conspicuous in the United States. Italy and the USSR are examples of the transition in southern and eastern European countries where the nineteenth-century levels of expectation of life as well as economic development and modernization in other respects were much lower. In spite of economic handi-

[55] *Loc cit*, para 30

[56] S N Agarwala, "Effect of a rise in female marriage age on birth rate in India", in *Proceedings of the World Population Conference*, vol II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No 66 XIII 6), p 172

Figure III. Trends in expectation of life at birth in selected countries[a]



SOURCE: For Sweden, 1798-1962: Nathan Keyfitz and Wilhelm Flieger, *World Population: An Analysis of Vital Data* (Chicago, Illinois, University of Chicago Press, 1968), p. 36; for France, 1805-1932: Jean Bourgeois-Pichat, "Note sur l'évolution générale de la population française depuis le XVIII[e] siècle", *Population*, vol. 7 (1952), pp. 326-327. For Italy, 1876-1887 and 1891-1900; and European Russia, 1874-1883 and 1896-1897: Louis I. Dublin, A. J. Lotka and Mortimer Spiegelman, *Length of Life* (New York, Ronald Press, 1949). For Sri Lanka, 1910-1912, 1920 1922: N. K. Sarkar, *The Demography of Ceylon* (Colombo, Ceylon Government Press, 1957). Others: United Nations, *Demographic Yearbook*, various issues.

[a] Averages of expectations for males and females.

[b] European Russia, Orthodox population, 1874-1883; European Russia, total population, 1896-1897; USSR, European part, 1926-1927; USSR, total, 1958-1959 and 1969.

caps, these countries also entered the phase of rapidly decreasing mortality rates during the 1880s and 1890s, keeping pace with the more developed countries in the west and eventually overtaking their lead. By 1960, Italy, the USSR, other countries in southern and eastern Europe,[57] and also Japan were nearly on a par in expectation of life with France, the United States, the United Kingdom of Great Britain and Northern Ireland, and other Western countries although still below the level of the Scandinavian leaders. The tapering-off of gains which marks the third phase of the mortality transition has been apparent since 1960 in all these countries.

[57] An exception is Albania, the least developed of the European countries, where expectation of life at birth was 66 years according to the most recent life table (1965-1966).

59. The less developed countries in Africa, Asia and Latin America remained generally in the first phase of the mortality transition through the early decades of the present century, with low and only slowly rising, if not stationary, expectation of life. A trend of quicker gains began during the 1920s and 1930s in those less developed countries where fairly reliable records extend back to that period, as illustrated in figure III by the examples of India, Puerto Rico and Sri Lanka. By the 1950s, the second phase of the transition was a general movement among those less developed countries for which time-series of mortality measures are available, although some of the least developed countries in Africa and other regions had probably not yet reached the stage of such rapid advances.

60. The extraordinary speed of the second-phase gains in expectation of life in some less developed countries since the 1940s has already been mentioned. A large share of the credit for this is due to modern advances in the control of infectious diseases by immunization, antibiotic therapy and eradication of insect vectors; and to applications of this new technology on an extensive scale in developing countries with the aid of the World Health Organization (WHO) and bilateral programmes of international co-operation. Consequently, the currently less developed countries or areas have been able to move ahead more quickly, on the whole, in the reduction of mortality rates than in other spheres of modernization. Their progress in agriculture, other sectors of economic development and education has also been an important factor in the mortality trends, although there are differences of scholarly opinion about the relative importance of these factors vis-à-vis the advances in medicine and health services.[58] But it is clear that a highly developed economy is no longer an indispensable condition for achieving a high standard of health and a low level of mortality. Witness the examples of Puerto Rico and Hong Kong, both of which have achieved a 70-year expectation of life according to the most recent life tables, rivalling the United States of America in this respect, although their income *per capita* is far lower. Puerto Rico and Hong Kong may now be considered developed so far as the conditions of mortality are concerned.[59]

61. In the process of the modernization of mortality, females have generally gained more than males

[58] This question is debated also with regard to the causes of the earlier declines of mortality in currently more developed countries. Relevant literature is reviewed in *The Determinants and Consequences of Population Trends*, chap. V, paras. 163-218. S. Kuznets concludes that the link between economic growth and decline of mortality have not been rigid and emphasizes the importance of social decisions (*loc. cit.*, paras. 5-6, 20). Y. N. Guzevatyi stresses the importance of income distribution, social provisions for meeting the needs of all classes in the population and the end of colonialism (*loc. cit.*, paras. 13-18).

[59] The Netherlands Antilles, with expectation of life at birth given as 71.4 years in the 1961-1963 life table, is another example. In Fiji, the 1966 life table shows an expectation of 69.5 years for the Fijian population, but only 66 years for the Indians.

in expectation of life. While the statistics of almost all countries show females as having an advantage over males in longevity, the difference has tended on the whole to widen as the mortality rates of both sexes have diminished.[60] This feature is apparent especially in the recent trends in countries where mortality has fallen to the lowest levels. The tapering-off of gains which marks the third phase of the mortality transition is more pronounced in the trends of male than of female life expectancy, as the examples in table 9 show. If it is true,

medical science or major changes in life-styles and social organization, then the ceilings seem to be from five to ten years lower for males than for females It is a noteworthy fact that male life expectancies in the USSR, and in England and Wales, France, the United States of America and other western industrialized countries have been levelling off from three to seven years below those of the Scandinavian countries. The trends in Japan and in less developed countries or areas that have recently achieved very low mortality, represented in table 9 by Hong Kong and Puerto Rico, suggest that they may rise to higher ceilings of life expectation for males.

62. Although the modernization of mortality has brought important reductions in death rates of males and females at all ages, the rates have decreased proportionately more for children and young adults than for older age groups In other words, more has been accomplished in diminishing the risks of premature

[60] *The Determinants and Consequences of Population Trends*, chap V, paras 32-39

TABLE 9. RECENT TRENDS IN EXPECTATION OF LIFE OF MALES AND FEMALES AT BIRTH IN SELECTED COUNTRIES AND AREAS OF LOW MORTALITY

Period	*Males*			*Females*			*Excess of female over male expectation*
	Expectation	*Lag* [a]	*Annual gain* [b]	*Expectation*	*Lag* [a]	*Annual gain* [b]	
			Sweden				
1938-1942	65 6	—	—	68.4	—	—	2.8
1948-1952	70 0	—	0 44	72 8	—	0 44	2 8
1958-1962	71.5	—	0 15	75 2	—	0 24	3 6
1967	71 9	—	0 01	76 5	—	0 14	4 8
			England and Wales				
1941	58 5	7 5	—	64 6	6 1	—	3.8
1950-1952	66 4	3 8	0 79	71 5	1 5	0 88	5 1
1960-1962	68.1	3 8	0 17	74 0	1 4	0 25	5.9
1968-1970	68 6	3 1	0 06	74.9	1 6	0 11	6 3
			France				
1930-1932	54 7	7.7	—	59 4	5 1	—	4 7
1947-1950	61.8	7.8	0 42	67.5	4 6	0 48	5 7
1960	67 2	4 6	0 47	73 8	1 4	0 55	6 6
1969	67 6	4 1	0 4	75 3	1.2	0 17	7 7
			Italy				
1930-1932	53.8	8 4	—	56 0	8 5	—	2 2
1950-1953	63.8	6 2	0 49	67.2	6 0	0 55	3.4
1960-1962	67.2	4 4	0 44	72 3	3 1	0 50	5 1
1964-1967	67 9	3 7	0 16	73 4	2 6	0 24	6 5
			USSR				
1926-1927 [c]	41.9	18 0	—	46 8	15 4	—	4 9
1958-1959	64 4	6 8	0 70	71.7	3 1	0 78	7.3
1968-1969	65 0	6 7	0 06	74 0	2 4	0 23	9 0
			Japan				
1935-1936	46 9	17 1	—	49 6	16 9	—	2.7
1949-1950	56 2	13 9	0 66	59 6	13 3	0 71	3 4
1960	65 3	6 3	0 87	70 2	5 0	1 00	4 9
1968	69 0	2 8	0 46	74 3	2 4	0 51	5.3
			United States of America				
1939-1941	61 6	4 0	—	65 9	2 5	—	4 3
1949-1951	65 5	4.5	0 39	71 0	1 8	0 41	5 5
1951-1961	66 8	4 8	0 13	73 4	1 8	0 24	6 6
1969	66 8	4 9	0 00	74 3	2 2	0 10	7 5

TABLE 9 (*continued*)

Period	Males: Expectation	Males: Lag [a]	Males: Annual gain [b]	Females: Expectation	Females: Lag [a]	Females: Annual gain [b]	Excess of female over male expectation
Puerto Rico							
1939-1941	45.1	20.5	—	47.1	21.3	—	2.0
1949-1951	59.4	10.6	1.43	62.4	10.4	1.53	3.0
1959-1961	67.1	4.4	0.77	71.9	3.3	0.95	4.8
1969-1971	69.0	2.9	0.19	75.2	1.3	0.33	6.2
Hong Kong							
1961	63.6	—8.0	—	70.5	4.8	—	6.9
1968	66.7	—5.0	0.44	73.3	3.1	0.40	6.6

SOURCE: For Sweden, 1938-1962; and England and Wales, 1941-1962: Nathan Keyfitz and Wilhelm Flieger, *World Population: An Analysis of Vital Data* (Chicago, Illinois, University of Chicago Press, 1968), p. 36; for France, 1930-1932, Jean Bourgeois-Pichat, "Note sur l'évolution générale de la population française depuis le XVIII[e] siècle", *Population*, vol. 7 (1952), pp. 326-327. Others: United Nations, *Demographic Yearbook*, various issues.

[a] Difference between the expectation in the given country or area and in Sweden.

[b] Average annual increment in expectation since the date of the preceding measure.

[c] European part.

TABLE 10. EXAMPLES OF CHANGES IN MORTALITY RATES OF MALES AND FEMALES ACCORDING TO AGE, IN THREE COUNTRIES

(*Life-table mortality rates, m_x, per 1,000 population of specified age and sex, per annum*)

Sex and age	Sweden 1901-1910	Sweden 1961-1965	Sweden Absolute change	Sweden Percentage change	Mauritius 1942-1946	Mauritius 1951-1953	Mauritius Absolute change	Mauritius Percentage change	Trinidad and Tobago 1930-1932	Trinidad and Tobago 1959-1961	Trinidad and Tobago Absolute change	Trinidad and Tobago Percentage change
Males												
Expectation of life at birth	54.5	71.6	+17.1	+31	32.2	49.8	+17.6	+55	44.5	62.2	+17.6	+40
Mortality rates												
Under 1 year	92.6	16.6	—76.0	—82	195.8	107.1	—88.7	—45	143.6	53.3	—90.3	—62
1 year	22.8	1.0	—21.8	—96	57.5	28.2	—29.3	—51	28.8	6.3	—22.5	—78
2 years	10.9	0.9	—10.0	—92	30.8	13.1	—17.7	—57	9.9	2.3	— 7.6	—77
5 years	5.0	0.7	— 4.3	—86	8.5	2.9	— 5.6	—66	3.7	0.8	— 2.9	—78
10 years	3.2	0.4	— 2.8	—88	4.4	1.5	— 1.9	—43	2.8	0.8	— 2.0	—71
15 years	3.2	0.6	— 2.6	—81	6.9	2.0	— 4.9	—71	3.8	1.1	— 2.7	—71
20 years	6.4	1.2	— 5.2	—81	13.4	3.3	—10.1	—75	6.4	1.5	— 4.9	—76
30 years	6.0	1.2	— 4.8	—80	19.6	5.4	—14.2	—72	8.5	2.4	— 6.1	—72
40 years	7.6	2.1	— 5.5	—72	28.2	10.6	—17.6	—62	15.7	4.7	—11.0	—70
50 years	11.2	5.3	— 5.9	—53	47.7	24.2	—23.5	—49	25.9	12.5	—13.4	—52
60 years	20.7	14.9	— 5.8	—28	85.2	45.3	—39.9	—47	49.5	28.5	—21.0	—42
70 years	46.4	39.6	— 6.8	—15	135.2	99.6	—35.6	—26	100.8	68.8	—32.0	—32
Females												
Expectation of life at birth	57.0	75.7	+18.7	+33	33.8	52.3	+18.5	+55	47.0	66.3	+19.3	+41
Mortality rates												
Under 1 year	76.0	12.9	—63.1	—83	172.0	95.2	—76.8	—45	120.3	43.7	—76.6	—64
1 year	21.2	0.9	—20.3	—96	66.8	32.5	—34.3	—51	30.4	5.2	—25.2	—83
2 years	10.3	0.6	— 9.7	—94	31.2	16.6	—14.6	—47	11.2	1.9	— 9.3	—83
5 years	5.2	0.4	— 4.8	—92	9.0	3.7	— 5.3	—59	3.8	0.7	— 3.1	—82
10 years	3.3	0.3	— 3.0	—91	4.0	2.0	— 2.0	—50	2.4	0.5	— 1.9	—79
15 years	4.2	0.4	— 3.8	—90	8.5	3.1	— 5.4	—64	4.9	0.7	— 4.2	—86
20 years	5.3	0.4	— 4.9	—92	18.8	5.0	—13.8	—73	7.4	1.2	— 6.2	—84
30 years	6.1	0.7	— 5.4	—89	21.1	7.6	—13.5	—64	9.6	2.3	— 7.3	—76
40 years	7.0	1.3	— 5.7	—81	21.8	8.3	—13.5	—62	12.9	4.0	— 8.9	—69
50 years	9.1	3.5	— 5.6	—62	28.9	13.3	—15.6	—54	20.7	9.7	—11.0	—53
60 years	16.6	8.5	— 8.1	—49	53.7	28.4	—25.3	—47	37.2	20.1	—17.1	—46
70 years	40.3	27.3	—13.0	—32	100.5	59.2	—41.3	—41	74.0	42.0	—32.0	—43

SOURCE: United Nations, *Demographic Yearbook*, various issues.

death than in lengthening the life span of survivors beyond middle age In terms of absolute rather than proportionate amounts of decrease in the death rates, by far the greatest achievements have been in cutting down the mortality in the first years of childhood It is, above all, by the savings of life in these early years that expectation of life at birth has increased and the over-all level of death rates has been lowered These facts are illustrated in table 10, using three countries as examples.[61]

63. The changes in Sweden between 1901-1910 and 1961-1965 are representative of the historical pattern of declining mortality rates in more developed countries The rates decreased proportionately most for children at the age of 1 or 2 years and somewhat less for infants under 1 year, older children and adults up to the age of 40 At higher ages, the proportionate decreases were progressively smaller. The age pattern of the recent mortality decline in Trinidad and Tobago was somewhat different, with infants in the first year of life benefiting proportionately less and adults over 60 years proportionately more. The difference from the Swedish pattern was accentuated in the case of Mauritius between 1942-1946 and 1951-1953 Here the proportionate decline of mortality was relatively small in infancy and all the ages of childhood, and greatest in the young adult ages Patterns resembling those of Mauritius and Trinidad and Tobago appear also in the statistics of several other less developed countries, although not in all those where mortality has decreased greatly since the Second World War Likewise, in the less developed countries that have reached the highest levels of expectation of life, it is the mortality of adults rather than that of children which compares most favourably with the rates in more developed countries or areas This point is brought out by comparing the rates for Hong Kong and Puerto Rico with those of the United States

Age (years)	Death rates per 1,000 population of specified age, 1965			Ratio of Puerto Rican to United States rates	Ratio of Hong Kong to United States rates
	United States of America	Puerto Rico	Hong Kong		
Under 5	5 3	8 6	6 0	1 6	1.1
5-9	4	6	6	1.5	1 5
15-19	1 0	1 1	7	1 1	7
25-29	1 3	1 5	1 1	1 1	8
35-39	2 4	2 6	2 1	1 1	9
45-49	5 8	4 8	5 3	8	.9
55-59	13 9	10 4	12 1	8	9
65-69	31 7	25 6	26 6	8	8
75-79	68 1		64 6		9

SOURCE· Data from *Demographic Yearbook, 1966* (United Nations publication, Sales No 67 XIII 1) The 1965 rates for the United States of America are provisional The rate for ages under 5 years in Puerto Rico has been calculated by weighting the given rates for ages 0-1 and 1-4 by the corresponding population estimates

64 These observations suggest that low income and lagging modernization in other respects may be greater handicaps to progress in the reduction of infant and child than of adult mortality The health of children and especially of infants depends to a great extent upon nutrition, hygiene, pure food and water, and the care which the parents are able and willing to give In fact, it can be said that mortality in infancy and childhood, aside from economic and social circumstances, reflects the concern for human life as a thing valuable for its own sake The level of fertility is another factor which may have an important bearing on infant and child mortality On this score there is good cause to state that the effective control of unwanted fertility is probably a prerequisite of a generalized concern to promote infant and child survival At any rate, the "modernization of mortality" certainly promotes control of infant and child mortality as well as fertility

65 Infant mortality rates differ widely among countries in both the more developed and the less developed regions The lowest rates, below 12 per 1,000 live births, recorded around 1970 are those of the Netherlands, Sweden and Finland Rates between 12 and 30 per 1,000 are recorded in most other European countries, the USSR, United States of America, Canada, Australia, New Zealand and Japan, but the level is above 40 in Portugal, Romania and Uruguay; and above 50 in Yugoslavia and Argentina The range of infant mortality rates is much wider among countries or areas in the less developed regions, below 20 per 1,000 in Hong Kong and Singapore, and probably 200 or even higher in a number of African countries and some of those in Asia, though in these instances reliable statistics are hard to come by. It has been conjectured that in all the less developed regions combined, infant mortality may recently have come to an average of 140 per 1,000 live births.

66 The global picture of trends in infant mortality since the Second World War, so far as it can be discerned in the spotty and often unreliable statistics, is

TABLE 9 *(continued)*

Period	Males: Expectation	Males: Lag [a]	Males: Annual gain [b]	Females: Expectation	Females: Lag [a]	Females: Annual gain [b]	Excess of female over male expectation
Puerto Rico							
1939-1941	45.1	20.5	—	47.1	21.3	—	2.0
1949-1951	59.4	10.6	1.43	62.4	10.4	1.53	3.0
1959-1961	67.1	4.4	0.77	71.9	3.3	0.95	4.8
1969-1971	69.0	2.9	0.19	75.2	1.3	0.33	6.2
Hong Kong							
1961	63.6	−8.0	—	70.5	4.8	—	6.9
1968	66.7	−5.0	0.44	73.3	3.1	0.40	6.6

SOURCE: For Sweden, 1938-1962; and England and Wales, 1941-1962: Nathan Keyfitz and Wilhelm Flieger, *World Population: An Analysis of Vital Data* (Chicago, Illinois, University of Chicago Press, 1968), p. 36; for France, 1930-1932, Jean Bourgeois-Pichat, "Note sur l'évolution générale de la population française depuis le XVIII[e] siècle", *Population*, vol. 7 (1952), pp. 326-327. Others: United Nations, *Demographic Yearbook*, various issues.

[a] Difference between the expectation in the given country or area and in Sweden.

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Sex and age	Sweden 1901-1910	Sweden 1961-1965	Sweden Absolute change	Sweden Percentage change	Mauritius 1942-1946	Mauritius 1951-1953	Mauritius Absolute change	Mauritius Percentage change	Trinidad and Tobago 1930-1932	Trinidad and Tobago 1959-1961	Trinidad and Tobago Absolute change	Trinidad and Tobago Percentage change
Males												
Expectation of life at birth	54.5	71.6	+17.1	+31	32.2	49.8	+17.6	+55	44.5	62.2	+17.6	+40
Mortality rates												
Under 1 year	92.6	16.6	−76.0	−82	195.8	107.1	−88.7	−45	143.6	53.3	−90.3	−62
1 year	22.8	1.0	−21.8	−96	57.5	28.2	−29.3	−51	28.8	6.3	−22.5	−78
2 years	10.9	0.9	−10.0	−92	30.8	13.1	−17.7	−57	9.9	2.3	− 7.6	−77
5 years	5.0	0.7	− 4.3	−86	8.5	2.9	− 5.6	−66	3.7	0.8	− 2.9	−78
10 years	3.2	0.4	− 2.8	−88	4.4	1.5	− 1.9	−43	2.8	0.8	− 2.0	−71
15 years	3.2	0.6	− 2.6	−81	6.9	2.0	− 4.9	−71	3.8	1.1	− 2.7	−71
20 years	6.4	1.2	− 5.2	−81	13.4	3.3	−10.1	−75	6.4	1.5	− 4.9	−76
30 years	6.0	1.2	− 4.8	−80	19.6	5.4	−14.2	−72	8.5	2.4	− 6.1	−72
40 years	7.6	2.1	− 5.5	−72	28.2	10.6	−17.6	−62	15.7	4.7	−11.0	−70
50 years	11.2	5.3	− 5.9	−53	47.7	24.2	−23.5	−49	25.9	12.5	−13.4	−52
60 years	20.7	14.9	− 5.8	−28	85.2	45.3	−39.9	−47	49.5	28.5	−21.0	−42
70 years	46.4	39.6	− 6.8	−15	135.2	99.6	−35.6	−26	100.8	68.8	−32.0	−32
Females												
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1 year	21.2	0.9	−20.3	−96	66.8	32.5	−34.3	−51	30.4	5.2	−25.2	−83
2 years	10.3	0.6	− 9.7	−94	31.2	16.6	−14.6	−47	11.2	1.9	− 9.3	−83
5 years	5.2	0.4	− 4.8	−92	9.0	3.7	− 5.3	−59	3.8	0.7	− 3.1	−82
10 years	3.3	0.3	− 3.0	−91	4.0	2.0	− 2.0	−50	2.4	0.5	− 1.9	−79
15 years	4.2	0.4	− 3.8	−90	8.5	3.1	− 5.4	−64	4.9	0.7	− 4.2	−86
20 years	5.3	0.4	− 4.9	−92	18.8	5.0	−13.8	−73	7.4	1.2	− 6.2	−84
30 years	6.1	0.7	− 5.4	−89	21.1	7.6	−13.5	−64	9.6	2.3	− 7.3	−76
40 years	7.0	1.3	− 5.7	−81	21.8	8.3	−13.5	−62	12.9	4.0	− 8.9	−69
50 years	9.1	3.5	− 5.6	−62	28.9	13.3	−15.6	−54	20.7	9.7	−11.0	−53
60 years	16.6	8.5	− 8.1	−49	53.7	28.4	−25.3	−47	37.2	20.1	−17.1	−46
70 years	40.3	27.3	−13.0	−32	100.5	59.2	−41.3	−41	74.0	42.0	−32.0	−43

SOURCE: United Nations, *Demographic Yearbook*, various issues.

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Age (years)	Death rates per 1,000 population of specified age 1965			Ratio of Puerto Rican to United States rates	Ratio of Hong Kong to United States rates
	United States of America	Puerto Rico	Hong Kong		
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5-9	4	6	6	1.5	1.5
15-19	1 0	1 1	7	1 1	7
25-29	1 3	1 5	1 1	1 1	8
35-39	2 4	2 6	2 1	1 1	.9
45-49	5 8	4 8	5 3	8	.9
55-59	13 9	10 4	12 1	8	9
65-69	31 7	25 6	26 6	8	.8
75-79	68 1		64 6		.9

SOURCE Data from *Demographic Yearbook, 1966* (United Nations publication, Sales No 67 XIII 1) The 1965 rates for the United States of America are provisional The rate for ages under 5 years in Puerto Rico has been calculated by weighting the given rates for ages 0-1 and 1-4 by the corresponding population estimates

64. These observations suggest that low income and lagging modernization in other respects may be greater handicaps to progress in the reduction of infant and child than of adult mortality. The health of children and especially of infants depends to a great extent upon nutrition, hygiene, pure food and water, and the care which the parents are able and willing to give In fact, it can be said that mortality in infancy and childhood, aside from economic and social circumstances, reflects the concern for human life as a thing valuable for its own sake. The level of fertility is another factor which may have an important bearing on infant and child mortality On this score there is good cause to state that the effective control of unwanted fertility is probably a prerequisite of a generalized concern to promote infant and child survival. At any rate, the "modernization of mortality" certainly promotes control of infant and child mortality as well as fertility

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66 The global picture of trends in infant mortality since the Second World War, so far as it can be discerned in the spotty and often unreliable statistics is

TABLE 11. TRENDS OF INFANT MORTALITY RATES, 1950-1970, IN REGIONS OF EUROPE AND SELECTED COUNTRIES AND AREAS IN OTHER PARTS OF THE WORLD

Region and country or area	Rates per 1,000 live births			Percentage changes	
	1950	1960	1970	1950-1960	1960-1970
Regions of Europe:					
Northern Europe	33.0	22.0	17.0	−33	−23
Western Europe	52.0	29.0	20.0	−46	−31
Southern Europe	81.0	56.0	36.0	−31	−35
Eastern Europe	98.0	53.0	33.0	−46	−38
Countries in other more developed regions:					
USSR	84.0[a]	35.0	24	−65[b]	−33
United States of America	29.2	26.0	19.8	−11	−24
Canada	40.7	27.3	18.8	−33	−31
Argentina	67.4[a]	62.4	...	− 8[b]	...
Uruguay	51.0[a]	47.4[c]	42.6	− 9[b]	− 9[b]
Australia	24.5	20.2	17.9	−18	−11
New Zealand	22.7	22.6	16.7	—	−26
Japan	60.1	30.7	13.1[d]	−49	−43
Less developed countries or areas:					
Mauritius	76.3	69.5	57.0	− 9	−18
Costa Rica	90.2	70.8	67.1[e]	−22	− 5[b]
El Salvador	81.0	76.3	66.7	− 6	−13
Guatemala	113.4	91.9	88.4[d]	−19	− 4
Jamaica	78.3	51.5	32.2[d]	−34	−37
Puerto Rico	67.9	43.3	28.6	−36	−34
Trinidad and Tobago	80.3	45.4	39.7	−43	−13
Chile	153.2	125.1	87.5[e]	−18	−33[b]
Hong Kong	99.6	41.5	19.9	−58	−52
Singapore	82.2	34.8	20.5	−58	−41
Sri Lanka	81.6	56.8	50.3[f]	−30	−14[b]
West Malaysia	101.6	68.9	40.8[d]	−32	−41

SOURCE: For regions of Europe, United Nations Secretariat, "Recent demographic trends in Europe and the outlook until the year 2000", *Population Debate*, vol. I, part two, table 17. For other countries and areas, United Nations, *Demographic Yearbook*, various issues.

[a] 1951.
[b] Adjusted to a per-decade basis.
[c] 1959.
[d] Provisional.
[e] 1969.
[f] 1968.

one of generally declining rates in both the more developed and the less developed regions, and in areas of relatively low as well as high mortality. Table 11 shows estimates as of 1950, 1960 and 1970 for regions of Europe, together with recorded rates for countries in other more developed regions and a selection of less developed countries where the statistics are most reliable.[62] Two points are especially worth noting. First, progress has been slow in controlling infant mortality in some of the countries where the rates are relatively high, particularly in Latin America. Secondly, on the contrary, the developed countries which have entered the third phase of the mortality transition continued during the 1960s to make fairly rapid progress in reducing infant mortality although their gains in expectation of life were tapering off. It is mainly in the control of adult mortality, especially of males, that the progress of these countries has slowed down, as illustrated by the data for regions of Europe given in table 12. It is true, though, that in some of the countries where infant mortality was lowest, it decreased proportionately less during the 1960s than the 1950s. Where infant deaths have been reduced to two in a hundred or less, as in most countries where expectation of life now exceeds 70 years, evidently not much scope remains for further saving of lives at this early age.

67. Mortality is composed of causes of death which differ in their resistance to control through improvement of medical knowledge and practice, public health services, and social and economic conditions, as the strata of a rock formation differ in their hardness and resistance to erosion.[63] In pre-modern mortality, the strata of soft causes, including especially the infectious, parasitic and respiratory diseases, are thick; a major fraction of all

[62] Even in this selection, it is by no means the case that the measures of infant mortality in all the countries are strictly accurate. The rates are considerably understated in some cases as a result of omissions in registration, and the amounts of decreases may also be understated in some cases where the functioning of the registration systems has improved.

[63] J. Bourgeois-Pichat, *loc. cit.*, p. 393.

TABLE 12 PROBABILITIES OF DYING, PER 10,000 POPULATION, BETWEEN SPECIFIED AGES, FOR MALES AND FEMALES IN REGIONS OF EUROPE, AROUND 1960 AND 1970

Sex and age	*Northern Europe*			*Western Europe*			*Southern Europe*			*Eastern Europe*		
	1960	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*
Males												
0-1 year	249	195	-22	334	217	-35	588	409	-30	572	379	-34
1-5 years	42	33	-22	55	40	-28	130	59	-55	77	58	-25
5-25 years	148	139	- 6	182	194	+ 6	185	166	-10	208	184	-12
25-45 years	369	354	- 4	450	464	+ 3	444	423	- 5	471	513	+ 9
45-65 years	2,412	2,395	- 1	2,481	2,396	- 3	2,250	2,189	- 3	2,366	2,409	+ 2
65-75 years	3,993	4,044	+ 1	3,877	3,982	+ 3	3,641	3,698	+ 2	3,888	4,069	+ 5
Females												
0-1 year	191	149	-22	259	166	-36	503	340	-32	465	298	-36
1-5 years	33	25	-24	44	31	-30	129	55	-58	70	50	-29
5-25 years	72	69	- 4	86	88	+ 2	119	86	-28	110	90	-19
25-45 years	250	223	-11	275	245	-11	312	237	-24	313	262	-16
45-65 years	1,393	1,337	- 4	1,373	1,258	- 8	1,381	1,233	-11	1,487	1,396	- 6
65-75 years	2,630	2,415	- 8	2,603	2,376	- 9	2,678	2,454	- 8	2,909	2,797	- 4

SOURCE United Nations Secretariat, "Recent demographic trends in Europe and the outlook until the year 2000", *Population Debate*, vol I, part two, table 19

deaths is due to such causes The reduction of mortality rates in the process of modernization is achieved mainly by the progressive elimination of these causes As the soft strata are worn away, the structure of mortality changes. The less tractable causes, such as cancer, heart disease and other ailments related to the degeneration of the body in the process of aging, emerge as leading causes of death In infant mortality, the hard strata of genetic defects and injuries in gestation and delivery stand out more prominently as the level of mortality is reduced Further gains in expectation of life grow more and more difficult to achieve

68. The hardening of the structure of mortality is illustrated by the changes in relative importance of five major groups of causes of death in England and Wales over approximately 100 years

	Percentage of all deaths, England and Wales		
	1848-1872	*1901-1910*	*1956 1957*
Infectious, parasitic and respiratory diseases	47	29	14
Cancer	1	5	19
Diseases of the circulatory system	12	19	48
Violence	5	5	5
Other, unknown and ill-defined causes	35	43	14
All causes	100	100	100

SOURCE *Population Bulletin of the United Nations*, No 6 (United Nations publication, Sales No 62 XIII 2), tables A2 1, A2 2, A2 7 Percentages have been calculated from the death rates for all ages

69. The long-term trends in risks of death from these groups of causes are indicated by the following death rates, standardized to eliminate the effects of changing age composition of the population:

	Death rates per 100,000 population, England and Wales		
	1848-1872	*1901-1910*	*1956-1957*
Infectious, parasitic and respiratory diseases	1,068	583	78
Cancer	35	62	109
Diseases of the circulatory system	278	190	248
Violence	76	83	35
Other, unknown and ill-defined causes	802	656	128
All causes	2,258	1,620	597

SOURCE *Population Bulletin of the United Nations*, No 6 (United Nations publication, Sales No 62.XIII 2), p 108 Percentages have been calculated from the death rates for all ages

70 Table 13 gives a view of the trends since 1950 in death rates for the major groups of causes in England and Wales and in Sweden [64] These rates are fairly representative of recent trends in more developed countries as a group In addition, the table shows corresponding rates in some other countries with reliable statistics

71 Risks of death from some causes may be increased by the changes in conditions and styles of life which modernization brings, as the trends in mortality attributed to cancer and heart disease imply The statistics exaggerate the increase in cancer mortality to the extent that deaths due to this cause in earlier periods were attributed mistakenly or intentionally to other causes There is fairly clear evidence, nevertheless, of an

[64] The rates in table 13 are crude rates, not standardized for age The distortions due to changes in age composition of the population in each country during the two decades may not be very serious, but comparability between the rates for more developed and less developed countries is impaired to a greater extent

TABLE 13. DEATH RATES FROM MAJOR GROUPS OF CAUSES IN SELECTED COUNTRIES, 1950-1970

(*Annual rates per 100,000 population*)

Causes of death	Sweden			England and Wales			Mauritius			Costa Rica			Puerto Rico			Sri Lanka		
	1950	*1960*	*1969*	*1950*	*1960*	*1970*	*1950*	*1960*	*1970*	*1951*	*1960*	*1969*	*1950*	*1960*	*1970*	*1949*	*1960*	*1968*
All causes	1001.9	1003.9	1045.4	1159.2	1150.2	1174.1	1388.5	1124.2	777.7	1166.8	859.0	688.3	992.1	668.5	664.1	1259.3	858.1	791.4
Infectious, parasitic and respiratory diseases	80.3	68.4	83.7	160.2	126.0	170.7	378.5	170.0	213.5	349.3	191.1	232.6	249.1	81.7	71.4	338.5	136.8	99.5
Tuberculosis	18.6	8.0	4.2	36.3	7.5	3.3	52.7	11.8	6.3	56.3	12.9	8.4	129.1	29.2	11.1	54.8	16.4	14.5
Malaria	0.0	0.0	0.0	0.0	0.0	0.0	83.5	0.0	0.0	55.6	1.3	0.0	2.4	0.0	0.0	32.9	0.6	1.4
Cancer	138.9	185.7	203.0	193.7	215.9	236.2	26.3	38.0	43.0	73.8	73.7	68.1	58.0	82.5	97.6	13.6	22.3	30.5
Diseases of the circulatory system	363.3	338.7	493.2	381.6	381.0	541.7	88.2	92.3	179.3	106.7	64.0	100.0	108.3	113.2	241.0	49.3	58.0	64.9
Violence	50.6	64.4	68.2	43.0	50.5	46.3	41.5	39.3	36.0	56.4	40.7	44.0	58.2	54.4	53.6	44.5	43.2	51.6
Other causes	279.8	327.5	189.8	358.3	360.8	172.0	678.8	530.5	161.8	460.3	368.2	190.4	421.9	282.8	181.3	618.1	417.4	351.7
Ill-defined and unknown causes [a]	88.6	19.2	7.5	22.7	16.0	7.2	175.2	254.1	144.1	120.1	121.3	53.2	96.8	53.9	19.2	195.4	180.4	193.2

SOURCE: United Nations, *Demographic Yearbook*, various issues.
[a] Including deaths attributed to senility.

increasing trend in mortality from cancer of the trachea, bronchi and lungs, especially among males, in many countries during the past two decades. Leukaemia and aleukaemia mortality has also been rising, and diseases of the circulatory system have been taking an increasing toll of lives among men above age 45 in almost all more developed countries.[65] If these adverse trends are not checked, expectation of life in these countries will not only cease to rise, but will eventually turn downward, sooner for males than for females The possibility of increasing mortality in the future from other causes related to pollution, congestion and social tension also cannot be ignored

72 Even in an optimistic view of the prospects for success in warding off these increasing threats to health and survival, the scope looks restricted for further gains in expectation of life in the foreseeable future, in the countries where it is now highest. It is true, in varying degrees among these countries, that room remains for reducing mortality from certain causes and in certain age groups, within the limits of current science and technology. A United Nations report states.

> "The relatively wide range of infant mortality rates still prevailing among developed countries, and the mortality differentials between certain sub-groups (whether geographical, socio-economic or ethnic) within these countries give evidence of the potential for further mortality reduction This may be achieved through the increased prevention of difficult-to-cure diseases about whose aetiology there is some knowledge (for example, the influence of smoking on respiratory cancer), through earlier detection of certain diseases as a result of improved diagnostic procedures as well as through frequent examination of various 'high-risk' groups (overweight persons for example), and through a continuance of the declining trend in mortality from accidents in the home or at work as a result of better safety measures."[66]

But not very many more years of life expectancy can be added in these ways unless some means are discovered of arresting the processes of aging in the human body. In the United States of America, for example, it has been calculated that even if all deaths before the age of 65 were eliminated, the expectation of life at birth would rise only to 79 years[67]

73 In the world's less developed regions, on the other hand, many millions of deaths occur every year which could be prevented by fuller application of known techniques and by improvement of nutrition and other conditions of healthy life The death rates from major groups of causes in Mauritius, Costa Rica, Puerto Rico and Sri Lanka shown in table 13 are examples of the progress since 1950 in some of the less developed countries which have made the greatest inroads into the soft strata of pre-modern mortality. Even among these countries, some still suffer high mortality from infectious, parasitic and respiratory diseases. The toll of lives due to these and other preventable causes is far greater in many other less developed countries Furthermore, a [illegible]

13, this trend shows up in Costa Rica, Puerto Rico and Sri Lanka

74 In the opinion of many experts, less developed countries cannot continue for long to make rapid progress in reducing mortality by intensifying and extending applications of health-protective technology without great advances in other spheres of modernization and economic development Persistent poverty and under-nutrition, poor housing, unhealthy conditions in the burgeoning cities and low levels of education are viewed as handicaps which are likely to impede progress in reducing mortality to an increasing extent as death rates are pushed to lower levels Thus, the future trends of mortality in less developed countries or areas may depend, more than they have in the recent past, on economic and social development[68] Probably few of the others, in their current economic circumstances, would be able to match the achievements of Hong Kong and Puerto Rico in expectation of life. According to one estimate, an expectation of 60-65 years may be the most that can be achieved in low-income countries without substantial economic progress[69] But there is room within that limit for an enormous saving of lives in the world's less developed regions.

75 In the less developed countries where excessive growth of population is regarded as an obstacle to social and economic advancement and a threat to future national welfare, sceptics may question whether it is wise to spend much on the development of public health and medical services, as this will only add to population growth by lowering the death rate But, as the report of the Symposium on Population and Development emphasizes, the reduction of sickness and mortality is in itself an objective of high priority which serves social as well as individual interests, and it may hasten the eventual achievement of demographic stability by promoting control of fertility.[70] Moreover, the modernization of mortality is probably a necessary condition for development of the economy to a high level.[71]

International migration

76 Migration no longer plays the major role in transforming the map of world population which it played during the nineteenth century and early years of the

[65] *The Determinants and Consequences of Population Trends*, chap V, paras 86 and 87

[66] *The Determinants and Consequences of Population Trends*, chap V, para 223

[67] *Population Bulletin of the United Nations*, No 6, p 12

[68] *The Determinants and Consequences of Population Trends*, chap V, paras 205, 208-218

[69] Jacques Vallin, "La mortalité dans les pays du Tiers Monde . évolution et perspectives", *Population*, vol 23 (1968), pp 845-868

[70] *Loc cit*, paras 79-80

[71] S Kuznets, *loc. cit*, para 27.

twentieth, at the height of the great movements from Europe to the New World, across the North American continent, from European Russia to the present Asian regions of the USSR and from India into south-eastern Asia. Although these movements continue, they are now much reduced in volume and more so in proportion to the population in the sending and receiving areas. Migration in the world today is primarily movement within countries, above all from rural sections to cities and from outlying regions to zones of metropolitan concentration. The volume of such internal migration has grown enormously during the past half a century, especially in the less developed countries, while the relative importance of international and especially intercontinental migration has dwindled. Since 1950, it is doubtful whether a dozen countries have gained or lost as many as a million people in the balance of migration across their borders. Even for the largest gainers and losers, the annual balance of immigration and emigration has been in most cases no more than a fraction of 1 per cent of the population.

77. The importance of international migration in the modern world is not negligible, however. Movements of comparatively small size may have great effects on population trends in some small countries. Some current and recent examples are the rapid build-up of population by immigration in Israel, Kuwait, Lesotho and Brunei; and the annulment or substantial moderation of growth by emigration in Barbados, Jamaica, Malta, Puerto Rico and Trinidad and Tobago. Among countries of larger population, net immigration has contributed one third or more of the increase since 1950 in Australia, the Federal Republic of Germany, France and Switzerland; while net emigration has drained off most of the natural increase in Portugal, all of it in Ireland and more than the natural increase in the German Democratic Republic (see table 14). Many of the immigrants in some countries remain only temporarily, but those who take up permanent residence are likely to contribute to the growth of population more than in proportion to their number because relatively many of them are likely to be young adults in the most fertile age groups. Conversely, permanent emigration is likely to have a disproportionate negative influence on the population trend in the sending countries. Ireland, for example, is a country of relatively many elderly people and few young adults to keep up the birth rate.

78. For many countries where the demographic impact of immigration or emigration is relatively slight, its economic importance is, nevertheless, significant. Immigration on a relatively small scale may be important in relieving labour shortages in certain occupations and industries or developing sparsely populated regions of a country. For little developed countries with emigration, while the outflow of educated and skilled manpower may be a costly loss, the emigrants' remittances may be a valuable asset. Immigrants or returning emigrants may contribute to social and cultural development far more than in proportion to their numbers.

79. Table 14 shows estimated net balances of immigration and emigration during 1950-1970 in the region of Europe, principal European countries of immigration and emigration, and Canada, the United States of America and Australia as the principal destinations of European emigrants overseas. The countries of largest net immigration in absolute numbers during this period were, in the order of size of their gains, the United States, the Federal Republic of Germany, France, Canada and Australia. In proportion to population, the net gain of Australia amounted to 21 per cent of the 1950 population, that of Switzerland to 14 per cent and that of Canada to 13 per cent. Of the net emigration countries, the largest losers were the German Democratic Republic, Portugal, Italy and Spain, each with a net migratory loss of more than 1 million during the 20 years. The heaviest proportionate losses, amounting to more than 10 per cent of the 1950 population, were those of Portugal, Ireland and the German Democratic Republic.

80. Western Europe was second to Northern America among the world's regions in volume of net immigration during the 1950s and 1960s. Southern Europe was the leading region of net emigration, and the net movement out of Eastern Europe was also relatively large. Europe as a whole, not including the USSR, lost 1 million more by emigration than it gained by immigration during these two decades. This net loss from Europe was the difference between a larger outflow to the Americas, Australia and other overseas areas, and a substantial inflow from North Africa, Turkey and other parts of Africa and Asia. While Canada, the United States and Australia continued, as in earlier times, to draw a large share of their immigrants from Europe, the flows to these countries from Asia, Latin America and Africa were larger than they had been prior to the Second World War, as a result of changed immigration policies and regulations.

81. Although some of the Latin American countries have continued to receive considerable numbers of immigrants from Europe, Latin America as a whole has become a region of slight net emigration since 1950. There have been some important movements between countries within Latin America and Africa, but satisfactory statistical bases for estimating the numbers involved are lacking.

82. In the future, although it is hard to foresee the volume of international migration in the world as a whole growing a great deal larger than it has been in the recent past, it is likely to continue to play an important economic role in many countries and a significant demographic role in some. The recent trends in more developed countries suggest that if fertility continues to decline, immigration may become the principal factor of population growth in some of those where wages are relatively high and labour demand outgrows the domestic supply in some sectors. For some of the smaller less developed countries, emigration may continue to be important as a safety valve for relief of

TABLE 14 NATURAL INCREASE AND NET MIGRATION COMPONENTS OF POPULATION CHANGE, IN REGIONS OF EUROPE AND PRINCIPAL COUNTRIES OF IMMIGRATION AND EMIGRATION IN EUROPE, NORTHERN AMERICA AND AUSTRALIA, 1950-1970

Region and country	*Population, 1950*	*Total increase 1950-1970*	*Natural increase, 1950-1970*	*Net migration, 1950 1970*	
		(millions)		*Millions*	*Percentage of 1950 population*
Europe excluding USSR, total	391.6	66 4	70 0	−3 6	− 0 9
Northern Europe	72 3	8 1	9.1	−1 0	− 1 6
Western Europe	122 4	25 0	17.3	+7 7	+ 6 3
Southern Europe	108 4	18 8	25 5	−6.7	− 6 2
Eastern Europe	88 5	14 4	18.1	−3 6	− 4 1
Principal European countries of net immigration,					
Germany, Federal Republic of	47 8	9 9	6.1	+3.7	+ 7.8
France	41.7	9 1	6 0	+3.1	+ 7 6
Switzerland	4 7	1 6	0 9	+0.7	+14 4
Belgium	8 6	1 0	0 8	+0 3	+ 3 0
Sweden	6 1	1 0	0.7	+0 3	+ 5 0
Principal European countries of net immigration'					
German Democratic Republic	17 2	−1.2	1 2	−2 4	−13 9
Portugal	8.4	0 2	2 2	−1 9	−23 1
Italy	46 6	6 5	8.5	−1 9	− 4 1
Spain	27 9	5 8	7 2	−1.4	− 4 9
Yugoslavia	16.3	4 0	4.8	−0 8	− 5 2
Greece	7 6	1 2	1 8	−0 6	− 7 7
Poland	24 8	7.6	8.1	−0 6	− 2 3
Ireland	3 0	−0 0	0.6	−0 6	−18 6
Finland	4 0	0 6	0 8	−0 2	− 5 6
Hungary	9 3	1 0	1.1	−0 2	− 1 8
Czechoslovakia	12 4	1.9	2 0	−0 1	− 1 2
Principal countries of immigration overseas'					
United States of America	152 2	53 1	46 4	+6 7	+ 4 4
Canada	13.7	8 7	6 9	+1 8	+13 1
Australia	8 2	4 4	2.7	+1.7	+20 7

SOURCE United Nations Secretariat, "Recent demographic trends in Europe and the outlook until the year 2000", *Population Debate*, vol. I, part two, tables 20-22; United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol I, part two, paras 18-19, United Nations, *Demographic Yearbook*, various issues

pressures associated with rapid population growth But emigration cannot be viewed realistically as a way of solving the population problems of the larger less developed countries. In India, for example, to reduce the current growth rate from the estimated 2 5 per cent to 1.5 per cent by emigration would require moving out nearly 6 million people annually. Merely to arrange and finance the transportation of such a number would be a huge undertaking, not to mention the problems of their installation, assimilation and absorption into the labour markets of whatever countries might be prepared to receive great numbers of them.

POPULATION STRUCTURE, LABOUR FORCE AND DEPENDENCY

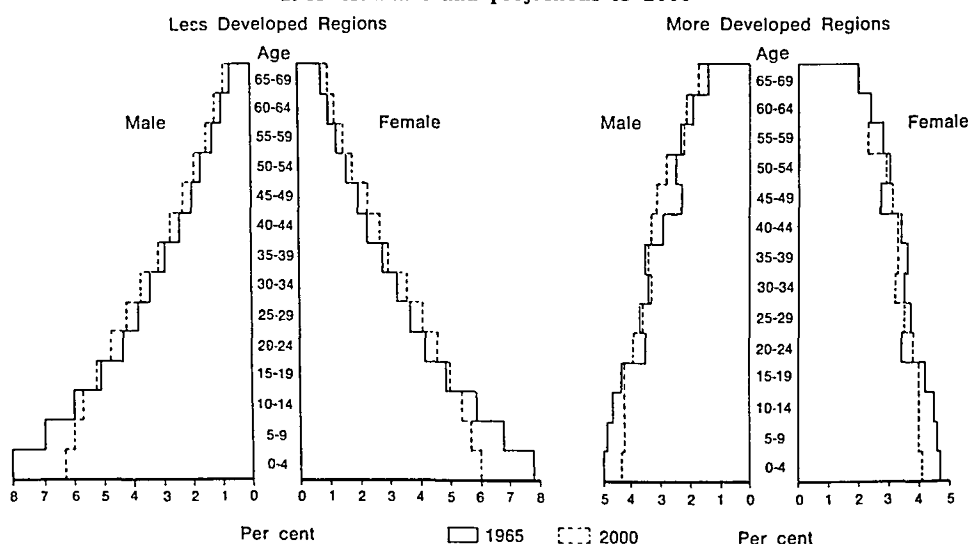
83. One of the characteristics of demographic pre-modernism is a youthful age structure of population, with many children and few old people in proportion to adults of intermediate ages. This feature, which is primarily the result of a high birth rate, can be seen in the chart of age structure of the population in less developed compared with more developed regions (figure IV). The structure in the less developed regions would be even more bottom-heavy if infant and child mortality rates were not so high. In fact, as a result of the reductions in mortality during the past few decades, the proportion of child population has been increasing somewhat in these regions. This trend is expected to be reversed in the future by declines of fertility offsetting the effect of further declines of mortality. The changes in population structure since 1950 and those projected for 1970-2000 are represented succinctly by the following percentages.

Age (years)	Less developed regions			More developed regions		
	1950	*1970*	*2000*	*1950*	*1970*	*2000*
Under 15	40.5	40.6	36.3	27.9	26.7	22.8
15-64	56.0	55.6	59.2	64.6	63.7	64.9
65 and over	3.5	3.8	4.5	7.5	9.6	12.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 8; and "World and regional population prospects", *Population Debate*, vol. I, part two, table 4. The projections for 2000 are those of the medium variant.

84. The expansion of the central age bracket in less developed regions might be of some advantage in economic development as it would tend, if other factors remained equal, to raise the proportion of workers in the population and so to increase the potential of income production *per capita*. The possible importance of this is illustrated by the experience of Japan, where the shif of population structure resulting from the decline of th birth rate has brought about a considerable expansion i relative size of the labour force since 1950 (see tabl 15). But the same processes of development an modernization that promote the decline of fertility als

Figure IV. Sex/age structure of the population in less developed and more developed regions, 1965 estimates and projections to 2000



SOURCE: United Nations Secretariat, "World and regional population prospects", *Population Debate*, vol. I, part two, figure I.

TABLE 15. JAPAN: CHANGES IN POPULATION STRUCTURE, LABOUR FORCE AND DEPENDENCY, 1950-1965

	1950	*1960*	*1965*
Annual birth rate per 1,000 population [a]	30.2	18.2	17.2
Age structure of population (percentage):			
Under 15 years	35.4	30.0	25.6
15-64 years	59.7	64.2	68.1
65 years and over	4.9	5.8	6.3
Labour force participation rates (percentage):			
Males 15 years and over	86.0	85.0[b]	83.2
15-19 years	61.7	51.6[b]	39.1
20-24 years	90.5	87.9	87.4
25-44 years	96.8	97.4	98.0
45-64 years	90.2	91.5	93.0
65 years and over	51.6	50.8	50.7
Females 15 years and over	49.8	50.9[b]	49.9
Labour force per 100 total population [c]	44.0	47.2	49.1
Dependents per 100 workers [d]			
All dependants	127	112	103
Under age 15	79	63	52
Ages 15-64	41	41	43
Ages 65 and over	7	8	8

SOURCE: Official census and vital statistics of Japan.

[a] Averages for 1945-1949, 1955-1959 and 1960-1964.

[b] Provisional.

[c] Including in the labour force a small estimated number of employed children under 14 years of age.

[d] Persons not in the labour force per 100 in the labour force.

bring changes in the rates of employment of men and women in income-producing jobs, and these may counteract the effect of the population structure change A decrease in employment of males in the youngest and eldest age brackets, signifying increased school attedance and earlier retirement, goes almost universally with economic development and modernization The trend of women's employment is less predictable; it may either increase or decrease in the course of development and modernization, according to the circumstances in each country [72] In the case of Japan between 1950 and 1965, the level of participation by women in the labour force remained almost constant, and while the participation of males under age 25 decreased considerably, there was very little decrease in that of men over 65 This is not a typical case.

85. So it is by no means sure that the population structure changes expected as a result of declining fertility in less developed countries will bring an increase in relative size of the labour force and lighten the load of dependency On the contrary, according to unofficial projections, the numbers of non-workers are expected to increase more than the labour force in less developed regions during the 1970s Between 1980 and 2000, the projections indicate little change in relative numbers of workers and non-workers, although a change in age composition of the non-workers is foreseen It was assumed for these projections that the rates of participation by both males and females in the labour force would decrease in less developed regions while the trend in more developed regions would be mixed decreasing male and increasing female participation. The basis for assumptions about future trends is not as firm for females as it is for males Here is a summary of the results in terms of dependency ratios, i e , numbers of persons not in the labour force per 100 in the labour force

	Less developed regions			*More developed regions*		
	1970	*1980*	*2000*	*1970*	*1980*	*2000*
All dependants	151	162	161	124	123	124
Dependants under age 15	99	103	90	60	57	56
Dependants aged 15-64	47	53	62	47	46	45
Dependants aged 65 and over	5	6	9	18	20	23

SOURCE Philippe Bourcier de Carbon, "La main-d'œuvre en 1970 dans le monde et ses perspectives jusqu'en l'an 2000" (E/CONF 60/SYM I/24), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973, p 36

86 In relation to the problems of social and economic development, the number of children to be educated is more important than the total number of dependants to be supported The larger the relative size of the school-age population, the less can be accomplished to satisfy the demand and need for education by devoting any given share of national income to educational services and facilities The difficulty is compounded when the school-age population is not only large but at the same time growing rapidly, demanding heavy investments to expand the educational plant and giving rise to problems of recruitment and training of the necessary teachers and other staff This is the quandary in which almost all less developed countries currently find themselves, and it is a primary feature of their population problem Education is widely recognized as one of the principal keys to progress in economic growth and modernization and to the solution of the population problem itself It is rightly stressed, however, that the value of education depends upon what is taught and how well The report of the Symposium on Population and Development is concerned with the problem of maintaining a satisfactory standard of quality in education while satisfying the demand for universal education, where income is low and fertility high, the number of children is large in proportion to the adult population and the growth of the child population is rapid [73]

87 The contrast between less developed and more developed regions is impressive both as concerns the relative size of the school-age population and its rate of growth (see table 16) The 1970 estimates show half again more children aged 5-14 years per 100 of the labour force in less developed than in more developed regions There are also important differences in this ratio within both groups of regions. Relatively, East Asia has many fewer children of school age than South Asia, Africa and Latin America, Europe and the USSR have fewer than Northern America and Oceania (The school-age population estimates refer to the age group of 5-14 years and so do not reflect the problem of secondary education, which is also important; but the picture of variations would be similar if the population in secondary-school ages were included.) In less developed regions, according to the projections, the ratio of school-age population to labour force will rise higher by 1980.

[72] J D Durand, 'Economic development and dimensions of the labor force ", in International Union for the Scientific Study of Population, *International Population Conference, Liège, 1973*, vol 1, pp 397-409; and "The labour force in economic development and demographic transition", in Léon Tabah, ed , *Population Growth and Economic Development*, (forthcoming in 1974)

[73] *Loc cit*, paras 50-55

TABLE 16. PROJECTIONS OF LABOUR FORCE AND SCHOOL-AGE POPULATION IN MAJOR REGIONS OF THE WORLD, 1970-2000 (MEDIUM VARIANT)

Region	Labour force (millions)			School-age population[a] (millions)			School-age population per 100 labour force[a]			Annual rate of growth in school-age population[a] (percentage)					
	1970	1980	2000	1970	1980	2000	1970	1980	2000	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
World total	1,507	1,779	2,528	830	983	1,381	55	55	55	1.6	1.7	2.0	1.9	1.6	1.3
More developed regions	486	543	627	197	185	208	41	34	33	−0.7	−0.6	0.7	1.1	0.6	0.0
Less developed regions	1,021	1,236	1,901	633	798	1,173	63	65	62	2.3	2.3	2.3	2.1	1.7	1.5
Europe	202	216	241	76	74	79	38	34	33	0.1	−0.6	−0.1	0.6	0.6	0.3
USSR	123	141	160	49	42	53	40	30	33	−2.1	−1.2	1.6	2.0	1.1	−0.4
Northern America	90	105	132	45	38	46	50	36	35	−1.7	−1.6	1.0	2.1	1.0	−0.5
Oceania	8	10	14	4	5	6	51	48	45	1.0	1.6	2.4	1.9	1.4	1.0
Africa	134	168	280	94	122	225	70	73	80	2.6	2.6	3.2	3.2	3.1	2.8
East Asia	436	500	657	201	223	227	46	45	35	0.9	1.2	1.1	0.3	−0.7	−0.4
South Asia	428	526	852	285	383	595	67	73	70	3.0	2.9	2.6	2.4	2.1	1.7
Latin America	88	113	192	75	96	150	86	85	78	2.5	2.4	2.1	2.1	2.2	1.8

SOURCE: Population projections available to the United Nations and the International Labour Organisation as of March 1974.
[a] Children aged 5-14 years.

Thereafter it is expected to decrease except that no decrease of the ratio is expected in Africa before the close of the century. The ratios indicated for the year 2000 in Latin America and South Asia will still be double those of the more developed regions Rapid growth of the school-age population is expected to continue through the 1970s in the less developed regions, excluding East Asia Gradually slackening growth rates are projected for the 1980s and 1990s in Africa, Latin America and South Asia In the more developed regions, school-age population is expected to decrease in the 1970s, increase slightly in the 1980s and grow only negligibly in the 1990s

88 Of course, the less developed countries where fertility is already declining and others where the decline may begin very soon will benefit from an easing of their educational problem earlier How much they benefit, if at all, from the progress of economic development and modernization may depend to a great extent upon what is done to take advantage of the opportunity for educational advancement Governments may see in any apparent relaxation of pressure on education an opportunity to apply funds to improve the quality of education, or to divert them to other areas.[74] But there is room to argue that in the very long run, the reduction of fertility and the consequent change in population age structure might retard rather than promote social and economic progress A major force for progress in the less developed countries is the replacement of the older generations by the rising younger ones, who are better educated and more modern in their frame of mind, and hence more adaptable to the changing needs of the developing economy and society. This process of modernization through the succession of generations is slowed down when the relative numbers of the younger generations are diminished by a falling birth rate, and unless the education and other qualifications of the young are developed as rapidly as possible, there may be a risk of net loss in the forces of progress.[75]

The density of population

89 Obviously, the world is more crowded every year as the population increases, but crowding is not so much a matter of the number of people as of their distribution in space It has been estimated that only about 30 per cent of the land is permanently inhabited,[76] and the density of population varies enormously within the inhabited portion The increase is also distributed very unevenly. Although population is growing in almost every country—only the German Democratic Republic and Malta are listed in the 1971 *Demographic Yearbook* as showing slight decreases between 1963 and 1971—the rates of growth in that period vary from a fraction of 1 per cent per annum in many European countries to 9 8 per cent in Kuwait and higher in some small island areas. Within many countries, large areas are being progressively depopulated For example, in the United States of America, while the total population increased by 13.3 per cent between 1960 and 1970, losses were recorded in three states (North Dakota, South Dakota and West Virginia) and the District of Columbia, and in 1,369 of the 3,141 counties [77] The principal cause of increased crowding is the growing concentration of population in cities and metropolitan zones It is estimated that the world's urban areas, containing 36 per cent of the global population in 1970, have received 56 per cent of the increase since 1950 About 68 per cent of the increase during the next 30 years will crowd into urban areas, according to the projections made by the United Nations Secretariat, and by the year 2000, 50 per cent of the world population will be city-dwellers

90 The density of population in relation to total area of land varies widely among the 24 regions of the world considered in this report According to 1970 estimates, the density ranged from two persons per square kilometre in Australia and New Zealand and five or six per square kilometre in Melanesia and Middle Africa to 149 in Western Europe and 280 in Japan (see table 17) The 1970 world average is estimated at 27 per square kilometre of the total land area excluding Antarctica up from 18 in 1950, and it will rise to 47 by the year 2000 according to the projections A density of more than 350 per square kilometre by that time is projected for Japan, and more than 200 for Middle South Asia and the Caribbean region At 400 persons per square kilometre, there is an average of 5,000 square metres per person

91 There are wide variations of density among the countries within some of the regions For example, in Eastern Africa, one of the more sparsely populated regions with its average of 16 persons per square kilometre in 1970, the density rises to 130 in Burundi, 145 in Rwanda and 440 on the island of Mauritius, and drops to 6 in Zambia and 4 in Somalia. Within the Caribbean region, one of the more crowded parts of the world with its average of 108 per square kilometre, the Bahama Islands have less than 15, while Puerto Rico and Martinique have more than 300 and Barbados has more than 550 per square kilometre

92. The less developed regions are almost twice as densely populated on average as the more developed

[74] Jack Harewood, "Alo nos para [illegible] acerca de los [illegible] [illegible] (Mexico, 1970), vol II, p 133

[illegible] p 31

[77] United States of America, Bureau of the Census, *1970 Census of Population, Number of Inhabitants, U S Summary*, PC(1)-AL (Washington, D C, 1971), pp 23 and 25, and table 27

TABLE 17. DENSITY OF POPULATION IN RELATION TO TOTAL LAND AREA IN REGIONS OF THE WORLD, 1950, 1970 AND PROJECTIONS TO 2000

Region	Land area (thousands of square kilometres)	Population (millions)			Population per square kilometre	
		1950	1970	2000	1950	1970
World total	135,779	2,506	3,621	6,407	18	27
More developed regions, total	60,907	857	1,084	1,368	14	18
Below-average density	55,599	382	521	695	7	9
Australia and New Zealand	7,955	10	15	25	1	2
Temperate South America	3,727	25	36	53	7	10
Northern America	21,515	166	226	296	8	11
USSR	22,402	180	243	321	8	11
Above-average density	5,308	475	563	673	89	106
Northern Europe	1,636	72	80	91	44	49
Southern Europe	1,315	109	128	156	83	97
Eastern Europe	990	88	103	122	89	104
Western Europe	995	122	148	171	123	149
Japan	372	84	104	133	225	280
Less developed regions, total	74,872	1,649	2,537	5,039	22	34
Below-average density	51,952	387	653	1,547	7	13
Melanesia	524	2	3	6	3	5
Middle Africa	6,613	26	40	89	4	6
Southern Africa	2,701	14	24	56	5	9
Northern Africa	8,525	51	86	202	6	10
Tropical South America	14,107	86	155	351	6	11
Eastern Africa	6,338	63	100	246	10	16
Western Africa	6,142	65	101	241	11	16
South-West Asia	4,506	44	77	183	10	17
Middle America, mainland	2,496	36	67	173	14	27
Above-average density	22,920	1,262	1,884	3,493	55	82
Polynesia and Micronesia	30	1	1	3	23	42
South-East Asia	4,498	173	285	617	38	63
East Asia [a]	11,383	590	822	1,240	52	72
Caribbean	238	17	26	49	71	108
Middle South Asia	6,771	481	749	1,584	71	111

SOURCE: Population estimates and projections available to the United Nations as of March 1974.
[a] Including other East Asia and excluding Japan.

ones, and this difference puts the inhabitants of the less developed regions at more than a proportionate disadvantage because they depend upon land for a large share of their relatively small income. The difference in density between less and more developed regions has increased during recent times and is expected to increase further in the future. Projected average densities in the year 2000 are 22 per square kilometre in the more developed and 67 per square kilometre in the less developed regions. However, some of the latter are far below and some of the former far above the world average of density. Table 17 shows the regions in the more and less developed groups arranged in the order of increasing density as of 1970.

93. The most disadvantaged position is that of the less developed regions with density above the average, namely East Asia excluding Japan, South-East Asia, Middle South Asia, the Caribbean and Polynesia and Micronesia. These regions support more than half of the world population on 17 per cent of the land area. In contrast, the more developed regions with density be average (Australia and New Zealand, Temperate S America, Northern America and the USSR) occup per cent of the land with 14 per cent of the wo population.

94. Both in the less developed and in the more veloped regions, it is those having the lowest dens which have gained population most rapidly during re decades, and this pattern is expected to continue in future. The trends are summed up in the follo figures:

	Percentage gain in popul	
	1950-1970	1970-
World total	44	77
More developed regions	26	26
Below-average density	36	33
Above-average density	19	20
Less developed regions	54	99
Below-average density	69	137
Above-average density	49	85

95. The effect, of course, is to diminish the relative disparity in distributions of population and land among regions within both the less developed and more developed groups, although the absolute disparity between the two groups grows larger.

	Percentage share in land area	Percentage share in population		
		1950	1970	2000
World total	100	100	100	100
More developed regions	45	34	30	21
Below-average density	41	15	14	11
Above-average density	4	19	16	10
Less developed regions	55	66	70	79
Below-average density	38	15	18	24
Above-average density	17	51	52	55

96. Of course, land area is far from being a perfect measure of wealth in natural resources or even of space fit for habitation. The relatively low densities in South-West Asia and Northern Africa, for example, are misleading because much of the land in those regions is arid desert. Egypt, in 1971, had a density of only 25 persons per square kilometre of the total area, but within the inhabited and cultivated area the density exceeded 950 per square kilometre. The density measures exaggerate the amplitude of land resources in relation to population in Australia, where also a large fraction of the land is arid, and in Northern America and the USSR, where cold climate limits the value of a great deal of the area

97 Although the growth of population has intensified pressure on agricultural land in some less developed countries, there has been little change since 1950 in the average of agricultural population density in less developed regions and it has decreased in more developed regions This measure, defined as the number of agricultural population (agricultural workers and their dependants) per square kilometre of agricultural land (arable land plus land in orchads and other permanent crops), is given by major areas as of 1950 and 1970 in table 18.[78] The average for less developed regions is estimated at 221 per square kilometre for 1950 and 226 for 1970.

98 The difference between more and less developed regions is much greater in agricultural density than in over-all population density For more developed regions, the estimated average agricultural density was only 46 in 1950 and dropped to 31 in 1970 These low figures reflect the advance of labour-saving technology in the agriculture of industrialized countries. Among less developed regions, on the other hand, differences are less pronounced in agricultural than in over-all density,

[78] The figures discussed here have been taken from Food and Agriculture Organization of the United Nations, "Projections of world agricultural labour force and population, ... projections as assessed in 1968

TABLE 18 AGRICULTURAL POPULATION AND AGRICULTURAL LAND IN REGIONS OF THE WORLD, 1950 AND 1970, AND PROJECTIONS OF AGRICULTURAL POPULATION TO 2000

Region	Agricultural population (millions)			Agricultural land (thousands of square kilometres)		Agricultural population per square kilometre of agricultural land	
	1950	1970	2000	1950	1970	1950	1970
World total	1,580	1,860[a]	2,199[a]	12,290	14,010	129	132
More developed regions	299	207[a]	49[a]	6,500	6,690	46	51
Less developed regions	1,281	1,653[a]	2,150[a]	5,790	7,320	221	226
Europe	128	89	23	1,470	1,480	87	60
USSR	100	77	9	2,250	2,330	45	33
Northern America	22	10	5	2,210	2,200	10	5
Oceania	4	4	5	190	240[b]	19	18
Africa	171	239	378	1,870	2,040	92	117
East Asia	523	561	564	1,060	1,240	493	453
South Asia	545	763	1,081	2,400	3,250	227	235
Latin America	87	118	143	840	1,230	104	96

SOURCE: United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol I, part two, Food and Agriculture Organization of the United Nations, "Projections of world agricultural labour force and population, 1965-2000 a provisional study" ... ed to the Symposium ... 4-14 June 1973, p 9, ... 1970 and 2000 have been taken from Food and Agriculture Organization of the United Nations, *op cit.*, p 9, table 1a and appendix IV (a). They are still in conformity with United Nations population projections as assessed in 1968

[a] Totals of agricultural population for the world, more developed and less developed regions, for 1970 and 2000 have been slightly adjusted to take into account the discrepancies between international immigration and emigration assumptions in the corresponding projections of total population

[b] Not including cultivated grasslands in Australia

because a relatively large share of total land area in the regions of low over-all density is either unfit or undeveloped for agricultural use. Still, the average agricultural density is about four times as high in East Asia and twice as high in South Asia as it is in Africa or Latin America. Africa is the only major area where population growth has brought a considerable increase in the average agricultural density since 1950, from 92 to 117 per square kilometre by 1970. Minor decreases are indicated in the averages for East Asia and Latin America.

99. The density of agricultural population has been lowered or prevented from rising steeply in less developed countries in the face of rapid population growth in two ways: by increasing the areas of agricultural land and by shifting labour force from agriculture to other employment, either in rural industries or in the cities. The increase of agricultural land area has been especially important in South Asia and Latin America, where the areas were expanded by about 35 per cent and 45 per cent, respectively, between 1950 and 1970 according to the data compiled by the Food and Agriculture Organization of the United Nations (FAO) (see table 18). An increase of somewhat over 15 per cent is indicated in East Asia and about 10 per cent in Africa.[79]

100. The movement from agriculture to other fields of economic activity is reflected by the generally declining trends in percentage shares of agricultural population in total population:

	Agricultural population as percentage of total population		
	1950	*1970*	*2000*
World total	64	51	34
More developed regions	35	19	3
Less developed regions	79	65	43
Europe	33	19	4
USSR	56	32	3
Northern America	13	5	1
Oceania	29	22	14
Africa	79	70	46
East Asia	80	60	40
South Asia	78	68	52
Latin America	54	42	22

101. This trend, which is one of the primary measures of progress in modern economic development, has been most pronounced since 1950 in the more developed regions, especially the USSR; but it has also gone forward quite rapidly in East Asia and less rapidly in other parts of the less developed world. It implies that the productivity of agricultural labour is increasing at least enough to provide food for the expanding proportion of non-agricultural population. This is confirmed by estimates of output per worker in agriculture between 1961-1963 and 1969-1971, which show gains of more than 1.3 per cent per annum in Africa, 1.7 per cent per annum in Asia, and 2.0 per cent per annum in Latin America.[80]

102. The FAO projections of agricultural population to the year 2000 show the decreasing trend in the ratio of agricultural to total population continuing throughout the world on a steeper downward gradient than heretofore. In Latin America, the ratio is expected to be down by 2000 to a level only slightly above the current average of more developed regions. The position of East Asia in this respect is expected by that time to be not much less advanced than that of the more developed regions in 1950. But in spite of the diminishing share of agricultural population in total population, large increases in absolute numbers of agricultural population are projected for all less developed regions except those of East Asia and South-West Asia. The point of zero growth in agricultural population will be reached, according to the projections, about 1990 in East and South-West Asia, Polynesia and Micronesia, about 1995 in Western and Southern Africa and Tropical South America, and not before 2000 in other less developed regions.

103. It is beyond the scope of this paper to go into such vital questions as how far the future growth of agricultural population in less developed countries can be matched by further extension of the areas of agricultural land and by adaptations of technology to employ more labour per unit of land, and how this growth can be reconciled with the need for continuing rapid gains in productivity of agricultural labour. The projections imply that the world average of agricultural output per head of the agricultural population in 2000 will have to be raised about 50 per cent above the 1970 level if consumption of food and other agricultural products per head of the total population is not to be cut down.

Urbanization and metropolitan concentration

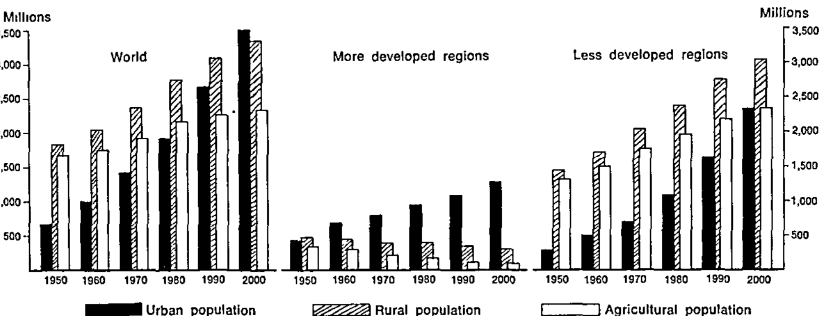
104. As the relative importance of agriculture in the economy diminishes, the rural-urban balance of population shifts rapidly towards a world of city-dwellers. Figure V depicts the prodigious growth of the world's urban population (as defined in various ways for the censuses of each country) since 1950 and the massive increase projected between 1970 and 2000. The share of urban population in the total has increased, as already mentioned, from an estimate of 27.6 per cent in 1950 to 36.3 per cent in 1970 and is projected up to 50 per cent in 2000. The more developed regions, already almost two thirds urban in 1970, are expected to exceed 80 per cent by 2000; while the urban population in less developed regions is projected to rise during these 30 years from 24.5 to 41.4 per cent of the total (see table 19).

105. Latin America is by far the leader among the less developed regions in urbanization. With 56.7 per cent urban according to the 1970 estimate, Latin

[79] In Africa, in particular, the areas of land currently cultivated have been increased further by shortening or eliminating periods of fallow and by increasing double-cropping in some areas.

[80] Ester Boserup, "Population and agricultural productivity", *Population Debate*, vol. I, part four; table 2.

Figure V. Urban, rural and agricultural population in the world, more developed and less developed regions, 1950-2000



SOURCE United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol I, part two, "World and regional population prospects", *Population Debate*, vol. I, part two, Food and Agriculture Organization of the United Nations, "Projections of world agricultural labour force and population, 1965-2000 a provisional study" (E/CONF 60/SYM I/22), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973

Note This *figure* has been drawn in conformity with population projections of the United Nations and the Food and Agriculture Organization of the United Nations, as assessed in 1968

TABLE 19. URBAN AND RURAL POPULATION IN REGIONS OF THE WORLD, 1950, 1970 AND PROJECTIONS TO 2000

Region	Urban population (millions)			Rural population (millions)			Urban as percentage of total population		
	1950	1970	2000	1950	1970	2000	1950	1970	2000
World total	692	1,315	3,205	1,814	2,306	3,202	27.6	36.3	50
More developed regions	436	693	1,118	422	391	250	50.8	63.9	81.8
Less developed regions	256	622	2,087	1,393	1,914	2,952	15.5	24.5	41.4
Europe	204	284	414	188	175	127	52.1	61.9	76.6
USSR	71	137	245	109	105	76	39.4	56.6	76.3
Northern America	106	168	256	60	59	40	63.6	74.2	86.4
Oceania	8	14	26	4	6	8	69.8	69.9	77.0
Africa	28	75	315	191	277	518	12.9	21.2	37.8
East Asia	99	246	645	574	681	728	14.7	26.5	47.0
South Asia	108	231	834	590	880	1,551	15.5	20.8	35.0
Latin America	67	161	470	97	123	155	40.9	56.7	75.1

SOURCE: Population estimates and projections available to the United Nations as of March 1974.

America rivals the USSR, the least urbanized of the more developed regions. By the year 2000, the share of cities in the Latin American population is expected to rise to three fourths, only slightly below the projected average of the currently more developed regions. East Asia, in 2000, will have about 47 per cent of urban population if the trend goes forward as projected. Africa and South Asia, currently the least urbanized major areas with urban shares estimated at 21.2 and 20.8 per cent, respectively, of the 1970 population, are projected to reach 37.8 and 35 per cent, respectively, in the year 2000.

106. As the urban population grows and expands its proportionate share in the total, it also becomes increasingly concentrated in large cities. It is estimated that cities of 1 million or more inhabitants contained 25 per cent of the world's urban population in 1950 and 31 per cent in 1970, and that their share may rise to 37 per cent by 1985. One out of six people in the world would then be living in a metropolis of such size. Here are the estimated and projected figures:

	Cities of 1 million or more		
	Number of cities	Population (millions)	Percentage of urban population
World totals			
1950	75	174	25
1970	162	416	31
1985	273	805	37
More developed regions			
1950	51	126	29
1970	83	223	32
1985	126	340	37
Less developed regions			
1950	24	48	19
1970	79	193	29
1985	147	465	37

SOURCE: United Nations Secretariat, "Demographic trends in the world and its major divisions, 1950-1970", *Population Debate*, vol. I, part two, table 15; *idem*, "World and regional population prospects", *Population Debate*, vol. I, part two, para. 51. Data are still in conformity with United Nations population projections as assessed in 1968.

107. In 1970, three cities had 10 million or more inhabitants if their suburbs are included, namely, New York, Tokyo and London. It is estimated that 12 other metropolitan agglomerations may reach this size by 1985: Mexico City, São Paulo, Los Angeles, Bombay, Calcutta, Osaka, Buenos Aires, Rio de Janeiro, the Rhine-Ruhr region of Germany, Cairo, Paris and Seoul.[81]

108. It is migration from rural communities to cities, and not either higher fertility or lower mortality in urban than in rural populations, which accounts for the rising proportions of urban to total population in countries throughout the world. By migration also, the concentration of urban population in the larger cities increases. The United Nations secretariat has estimated that, in the year 1960, urban areas in the world as a whole gained 16 million population by migration (i.e., the net balance of in-migrants less out-migrants) and approximately the same number by the excess of urban births over deaths. Likewise, within both more developed and less developed regions, the increase of urban population was due in roughly equal proportions to migration and natural increase. The rural-urban migration in less developed regions drained off about one fourth of the natural increase from rural areas; while in more developed regions the migration exceeded the rural natural increase, with the result that the rural population suffered a net loss of about 1.5 per cent during the year. The estimates are summed up below:

	Population changes in 1960 (millions)		
	Migratory shift[a]	Natural increase	Net change
World total			
Urban	+16.4	+15.8	+32.3
Rural	−16.4	+41.3	+24.9
More developed regions			
Urban	+ 7.2	+ 6.4	+13.6
Rural	− 7.2	+ 5.8	− 1.4

[81] United Nations Secretariat, "World and regional population prospects", *loc. cit.*, para. 52.

	Population changes in 1960 (millions)		
	Migratory shift[a]	Natural increase	Net change
Less developed regions			
Urban	+ 9 2	+ 9 5	+18 7
Rural	− 9 2	+ 3 5	+26 2

SOURCE "The components of urban and rural population change tentative estimates for the world and twenty-four regions for 1960" (ESA/P/WP 46)

[a] Net gain or loss through rural-urban migration within the region, interregional migration, and rural to-urban reclassification of areas

109. The causes of the increasing urbanization and concentration of population in large cities are, to a large extent, inherent in the processes of modern economic development Fundamental are· (*a*) the relative contraction of employment opportunity in agriculture and expansion in other sectors, resulting from more rapid growth of demand for non-agricultural products than for those of agriculture as the economy develops and income rises, as well as from labour-saving technological advances in agriculture, (*b*) the advantages in efficiency of production and distribution of products gained by spatial concentration in the non-agricultural sector (economies of scale, savings in transport costs, complementary relations between industries etc) [82] It is worth emphasizing, however, that non-economic factors also influence the currents of migration [83]

110 The flow of population from rural areas to the cities and the flow from agriculture to other economic sectors are not simply opposite faces of the same coin The non-agricultural population is not completely concentrated in cities, a more or less substantial fraction remains in rural areas Along with increasing urbanization goes a change in the structure of the rural sector, with service industries, trade and possibly mining and rural manufacturing industries gaining at the expense of agriculture in relative shares of the rural labour force Thus, between 1950 and 1970, the gain in the urban share of total population was less than the loss in the agricultural share both in more developed and in less developed regions, as can be seen in table 20 The rural population became less agricultural, and the degree of concentration of the non-agricultural population in urban areas remained approximately constant at 75-80 per cent in both groups of regions. [84] Similar trends are

[82] Kuznets sums up concisely the factors in the process of modern economic growth which demand and facilitate the movement out of agriculture and the increasing concentration of economic activities in urban centres, *loc cit*, para 12 Relevant literature is surveyed in *The Determinants and Consequences of Population Trends*, chap VI, paras 188-192

[83] *The Determinants and Consequences of Population Trends*, chap VI, paras 193-212

[84] The ratio of urban to non-agricultural population shown in table 19 does not measure exactly the degree of urban concentration of the non-agricultural population, because there is also some agricultural population in urban areas—indeed, not a negligible proportion in some developing countries It should also be noted that the ratios of agricultural to rural population and of urban to non-agricultural population may be affected considerably by the variations from country to country in census definitions of urban and rural areas

TABLE 20 RELATIONS OF URBAN, RURAL AND AGRICULTURAL POPULATION AND THEIR CHANGES, IN MORE DEVELOPED AND LESS DEVELOPED REGIONS 1950-1970 AND PROJECTIONS TO 2000

	Percentage of total population		Agricultural population per 100 rural population	Urban population per 100 non-agricultural population
	Agricultural	Urban		
World total				
1950	64	28	89	78
1970	51	37	82	77
2000	34	51	69	78
Change, 1950-1970	−13	+ 9	− 7	− 1
1970-2000	−17	+14	−13	+ 1
More developed regions				
1950	35	51	72	79
1970	19	64	53	79
2000	3	81	18	84
Change, 1950-1970	−16	+13	−19	0
1970-2000	−16	+17	−35	+ 5
Less developed regions				
1950	79	16	94	76
1970	65	26	88	74
2000	43	43	74	75
Change, 1950-1970	−14	+10	− 6	− 2
1970-2000	−22	+17	−14	+ 1

Note These data are still in conformity with United Nations population projections as assessed in 1968

indicated by the projections for 1970-2000 in the less developed regions, but the projections for the more developed regions indicate a closer correspondence between the contraction of agriculture and the increase of urbanization.

111. In the early stages of economic development and modernization, the absolute numbers of agricultural and rural population are likely to increase although their proportionate shares in the total population are diminishing. Eventually, if the process continues, the absolute numbers also will decrease, probably sooner for the agricultural than for the rural population as a rule. The urban population is likely to go on increasing much longer, although it, too, must eventually come to the point of zero growth if not decline.

112. In most of the currently more developed countries, both agricultural and rural populations have been decreasing in absolute numbers for several decades, and in some instances for half a century or longer. The agricultural and rural totals decreased steadily during the 1950s and 1960s in all the more developed regions except Oceania (see table 21), where the trend in number of the agricultural population turned downward during the 1960s.[85] An accelerating decline of ru population is projected for the remainder of the cent in all the more developed regions.

113. The urban population in all the more develop regions will continue to increase, according to projections, at least until the year 2000. Although trend of generally slackening rates of urban growth these regions is foreseen, growth rates as projected the decade of the 1990s are still quite vigorous, rangi from 8-9 per cent for the decade in Western a Northern Europe and Japan to 16-18 per cent Southern Europe, the USSR, Australia and N Zealand.

114. In the less developed regions, urban, rural a agricultural population are all growing rapidly, althou the growth rates of the urban are much higher than tho of the rural and agricultural populations. Trends generally slackening rates of growth in all three popul tion sectors are projected during 1970-2000 in the le developed regions, with some exceptions in Wester

[85] The agricultural population estimates are not available the same detailed form as the estimates of rural populati and are, therefore, not included in table 21.

TABLE 21. CHANGES IN URBAN AND RURAL POPULATONS IN MAJOR AREAS OF THE WORLD BY DECADES, 1950-1970, AND PROJECTIONS TO 2000

(Percentage)

Major areas	*1950-1960*	*1960-1970*	*1970-1980*	*1980-1990*	*1990-2000*
	Urban population				
World total	+41	+35	+36	+35	+32
More developed regions	+29	+23	+20	+18	+14
Less developed regions	+62	+50	+54	+50	+45
Europe	+18	+18	+15	+13	+12
USSR	+48	+31	+26	+22	+17
Northern America	+31	+21	+17	+16	+12
Oceania	+28	+30	+26	+24	+21
East Asia	+78	+40	+48	+37	+30
South Asia	+43	+50	+54	+55	+51
Africa	+64	+60	+64	+63	+58
Latin America	+56	+54	+48	+44	+37
	Rural population				
World total	+11	+14	+13	+12	+ 9
More developed regions	− 2	− 6	−10	−13	−18
Less developed regions	+15	+19	+18	+16	+12
Europe	− 2	− 5	− 8	−10	−13
USSR	0	− 4	− 9	−10	−12
Northern America	− 1	− 2	−10	−11	−14
Oceania	+21	+ 9	+11	+10	+ 8
East Asia	+ 6	+11	+ 7	+ 2	− 1
South Asia	+20	+24	+24	+22	+16
Africa	+18	+23	+23	+24	+23
Latin America	+15	+11	+10	+ 8	+ 6

SOURCE: Population estimates and projections available to the United Nations as of March 1974.

Eastern, and Middle Africa and Melanesia, where the rates are expected to accelerate somewhat in the 1970s and 1980s As already mentioned, a maximum of agricultural population is expected to be reached about 1990 or 1995 in mainland East Asia, South-West Asia, Southern Africa, Tropical South America, Polynesia and Micronesia, with subsequent declines The point of zero growth in rural population also will be reached about 1980 in Other East Asia For the remainder of the less developed regions, the projections show rural and agricultural population continuing to expand throughout the projection period.

115. In urban populations in less developed regions, high growth rates with little if any abatement before the 1990s are the outlook which appears in the projections The projected decade growth rates for the 1990s in urban population range from about 37 per cent in the Caribbean region to 72 per cent in Eastern Africa Over the 30-year period from 1970 to 2000, the projected urban increases range from 173 per cent in the Caribbean to 450 per cent in Eastern Africa, and even more in the as yet little urbanized region of Melanesia Here are the figures for major areas:

	Projected increases of urban population, 1970-2000	
	Millions	*Percentage*
East Asia	399	162
South Asia	603	261
Africa	240	320
Latin America	309	192
Total of less developed regions[a]	1,465	236
Total of more developed regions	425	61

[a] The above-listed major areas, but excluding Japan and Temperate South America

116. Among the varied problems of population facing countries in different parts of the world and in diverse circumstances, those related to urbanism and urban growth are the most common concern, and among the most perplexing They are bound to come more and more to the forefront in the future as the number of urban population, and its share in the total, increase in countries throughout the world The problems are numerous and complex, and include difficulties of adjustment of rural migrants to the conditions and demands of urban life, poverty, unemployment, pollution and environmental degradation; difficulties in meeting needs for investment in the development and redevelopment of housing, utilities, social services and other items of social and economic infrastructure Epitomes of these ills are the squalid shanty-towns that have sprung up within or on the outskirts of many cities in less developed countries, and the poverty-ridden slums which disgrace great metropolitan centres in some of the world's wealthiest countries. In the opinion of some authorities, much of the blame for such problems in less developed countries must go to "over-urbanization", conceived either as excessively rapid growth of cities or a level of urbanization that is out of line with the economic development of the countries concerned, or both. The alleged over-urbanization, in turn, is blamed to a large extent on population pressure in the rural hinterlands driving impoverished and unemployed or underemployed workers to migrate in desperation to the cities [86] Such theories are difficult to evaluate for lack of adequate knowledge of the determining factors in rural-urban migration, including the influence of rural population pressure, and also for lack of satisfactory criteria to judge what level or rate of urbanization would be optimal in the circumstances of each country from economic or other points of view

117 For better or for worse, as stated in a background paper for the Conference, the current flow of people from rural to urban areas must be recognized as inevitable and irreversible, although it can perhaps be re-channelled by well-planned and vigorously executed governmental action [87] In the less developed countries, enormous volumes of this migration must be expected and somehow accommodated during the decades ahead

[86] Philip M Hauser, "Implications for economic development of world geographical distribution and urbanization" (E/CONF 60/SYM I/18), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973, pp 12-20 Hauser concludes sombrely (p 20) "Finally, as a concomitant of rapid urbanization, it may be anticipated that present physical, social, economic and political problems in developing nations, already severe, will be exacerbated, and that they and the world as a whole face the prospect of increased social unrest and increased political instability"

[87] United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *loc cit*

ANNEX

Glossary of demographic terms

Agricultural population Persons in the agricultural labour force and their dependants

Annual growth rate Annual percentage population increase, generally expressed as an exponential rate It is the net result of the rates of birth, death and migration

Birth rate Annual number of live births per 1,000 persons of the total population Since this can be affected by variations in the population age structure, it is also often referred to as the "crude" birth rate

Death rate Annual number of deaths per 1,000 persons of the total population Since this can be affected by variations in the population age structure, it is also often referred to as the "crude" death rate

Dependency ratio The number of non-earners of income per 100 income earners Due to lack of statistics, this ratio can be expressed as the number of persons outside the labour force per 100 members of the labour force or, more crudely, the number of persons aged under 15 years and aged 65 and over per 100 persons aged 15-64 years

Expectation of life Average number of years to be lived, according to existing mortality conditions, from a specified

age onward. A commonly used measure is the expectation of life at birth.

Family size. Average number of children born alive to a woman during her reproductive life span.

Fecundity. The biological capacity of a person or a couple to reproduce is called fecundity, not to be confused with fertility, which refers to children actually born.

Fertility. The actual incidence of births in a population, not to be confused with fecundity.

Fertility rates. Annual numbers of births per 1,000 women in given age groups.

Gross reproduction rate. Average number of daughters born alive per woman during her reproductive life span according to existing fertility conditions.

Infant mortality rate. Annual number of deaths of live-born children less than one year old per 1,000 live births during the same year.

Labour force. Gainfully occupied persons and those actively seeking gainful work.

Marital fertility. Live births occurring to married women.

Mortality rates. Annual numbers of deaths per 1,000 persons of given age groups.

Natural increase. Number of deaths subtracted from the number of births. The rate of natural increase is obtained by subtracting the death rate from the birth rate. It differs from the annual growth rate by the balance of net migration.

Net migration. Number of emigrants subtracted from the number of immigrants.

Net reproduction rate. The average number of daughters per woman born under existing fertility conditions who would survive to child-bearing age under the existing mortality conditions. It differs from the gross reproduction rate in which t
intervening mortality conditions are not taken into account

Probability of dying. Proportion of persons dying between c
exact age and another exact age, according to existing mortal
conditions, per 1,000 persons of the initial exact age. It diff
from a mortality rate, since the latter is calculated per 1,0
persons living within the intervening age group.

Replacement level. A net reproduction rate of 1.0. If t
persists, a generation of mothers will be exactly replaced
an equal number of daughters. Owing to the interplay betwe
age structure, fertility and mortality, a population can contin
to grow over a long period after it achieves and maintai
replacement level, but ultimately it will cease to grow.

Stationary population. A population in which there is
migration, the birth rate equals the death rate (hence t
growth rate is zero), the age-specific fertility and mortali
rates are constant, and the age structure is constant.

Urban agglomeration. An urban locality within the contou
of dense habitation, usually a city including adjacents suburl
sometimes also a cluster of mutually adjacent cities.

Urbanization. This term may mean either the proportion
urban in the total population, or the rise in the proportion
urban in the total population. Countries differ in the criter
by which urban localities, and hence the urban populatio
are defined.

Vital rates. These are the various types of rates of birth, deat
marriage and divorce, related to population groups in whi
these events can occur.

Vital statistics. A system of recording the occurrence of birth
deaths, marriages and divorces, usually in the form of nation
registers.

POPULATION CHANGE AND ECONOMIC AND SOCIAL DEVELOPMENT

Report of the Secretary-General

1. Among the issues of international concern pertaining to current and prospective world problems and challenges, that of the interrelations between population and economic and social development claim a prominent place. Concern with this problem is hardly new, but it has become world-wide only in the past decades. During this period, the problems of development of the poorer countries came to be regarded as one of the world's major challenges. The attention of the international community and of individual countries has focused increasingly on efforts to accelerate development, both domestically and by means of stimulating and channelling international co-operation, and attempts to reduce inequalities among and within countries. The urgency of these development objectives has been widely recognized and progress along these lines is the major objective of the International Development Strategy for the Second United Nations Development Decade.

2. At the same time that the development problems came to the fore, demographic trends in the world revealed an unprecedented acceleration in the growth of population. With the spreading awareness of the dimensions of the population problem, apprehensions over the global, long-term impact of recent and prospective population trends have greatly increased There exists now considerable anxiety about the growth of world population and its relation to the earth's resources and the human environment in its broadest sense Although issues revolving around the long-term and global problems of the planet's resources, the environment and population are of concern to both developed and developing countries, the nature and circumstances of the problems are not the same. With the economically advanced countries currently accounting for by far the greater part of the world's consumption of resources and of the environmental deterioration associated with the advanced stages of industrialization, it is to be expected that long-term future trends will particularly affect these countries and are, therefore, of major concern to them This does not mean that the developing countries are not facing any problems in this respect. But unlike the case of the developed countries, where such problems are predominantly the result of advanced industrialization, in the developing countries they must be attributed mainly to poverty and the very lack of development. Resources and environment problems in these countries thus add to the urgency of the more immediate and pressing problems of their economic and social development, and its relation to population It is with these latter questions that the present document is mainly concerned.[1]

3 Apprehension about the post-war acceleration of population growth has increased because it particularly affects the developing countries. In the course of the past decades, death rates in these countries declined precipitously and at a much faster speed than historical experience had made it reasonable to expect or hope for Combined with continued high birth rates, the sudden and steep reduction of mortality caused population growth in the developing countries to soar to levels unparalleled in earlier history. This rapid increase of population and the characteristics associated with it brought once again to the fore, and in a critical manner, the question of its impact on and interrelations with economic growth and social progress and with the development efforts and schemes on which many of the developing countries were embarking.

4. The interrelations between demographic trends and economic and social change have been a subject of discussion for a long time Recent population growth against a background of widespread preoccupation with the problems of development has provided a forceful stimulus to intensive research and study of these interrelations. Nevertheless, few issues of economic and social change are more complex than the economic and social determinants and consequences of population trends The problem is further complicated by the wide divergence of demographic, economic, social and other conditions. The experience of population growth and demographic evolution has not been the same in different parts of the world or at different times This variety of demographic conditions is accompanied by wide differences in time and space with respect to levels and trends of development Moreover, great differences could and can be found in such fundamental characteristics as motivations, traditions, institutions and political conditions. In addition to these objective and factual conditions, students and experts from different disciplines, or even within the same disciplines, have seen and interpreted the phenomena from different angles and views of society and have reached different conclusions. It should, therefore, come as no surprise that on many issues, including some of the most impor-

[1] Aspects related to population resources and environment were considered under item 9 of the agenda. For a discussion of this subject, see "Population, resources and the environment: report of the Secretary-General", *Population Debate*, vol I, part one

tant, there is no unanimity among experts and professional students of the subject. However, in recent years there seems to have been a certain convergence of ideas and there are indications of an emerging consensus on some important aspects of the problem which has reduced the controversies and also provided a broader and more solid base for policy conclusions and action-oriented recommendations. The following discussion takes into account, among other considerations, the papers submitted to and the report of the Symposium on Population and Development, held at Cairo from 4 to 14 June 1973.* It has also benefited substantially from the assistance of Mr. Goran Ohlin.

The setting of the problem

5. The exceptional nature of demographic trends over the past decades is by now well known. It was in the course of these years that the long-term acceleration of the growth of world population culminated in a steep increase in growth rates. World population growth, which, on average, had been 0.5 per cent per annum in the nineteenth century and 0.8 per cent in the first half of this century, surged to 1.9 per cent per annum in the period from 1950 to 1970. Between these two dates, world population increased from about 2.5 thousand million to over 3.6 thousand million, or 44 per cent. As of mid-year 1974, it stands about 3.9 thousand million; and, with an annual growth rate of 2 per cent, some 80 million people will be added to the world population this year.

6. Population has never before increased at anything like the current speed and there is a consensus that current levels of growth cannot be maintained indefinitely or even for a period much beyond one or two centuries. Assuming for purely illustrative reasons that current growth trends were to continue unabated, it would take only one century for the earth to reach an average density of over 200 inhabitants per square kilometre, a figure comparable to that of the more densely settled countries today. The total population would be nearly 7.5 times its present size, and most experts agree that even rapid scientific and technological growth would not be likely to enable such a population to enjoy levels of living based on the high consumption of energy and other resources characteristic of the currently industrialized countries. Some even believe that such a large population would pose a serious risk to survival. Many dispute the latter view, but there would be much less controversy about the implications of yet another century of the same rapid growth, which would result in a population more than 55 times as large as the present one. There is a paradox here. On the one hand, if development takes place, the modernization and improved living conditions which are part of it could be expected to bring down the birth rate. On the other hand, development may not be possible as long as current high rates of population growth continue. I clear that an attenuation of population growt inevitable in the long run, but it need not be assu that current trends will in fact continue for long. historical experience, combined with the understan of population trends as affected by economic and so change, suggests that, as modernization proceeds, p ulations undergo a demographic evolution which sl down their growth significantly.

7. Although throughout most of human history growth of population has been welcomed as a sign social health and well-being and as a source of stren to the family, tribe or country, the current preoccupat with high population growth is not a novel phenomen The view that a persistent growth of population n give rise to a variety of strains has cropped up at vari times in history. Apprehensions about population tre in the countries of early industrialization were alre emerging late in the eighteenth century. Then, as in case of the developing countries now, the Europ countries stood at the beginning of a significant accele tion of population growth and on the threshold of th *industrialization.*

8. The historical experience of the currently ind trialized countries, supported by theoretical argumen intimates that a speeding-up of population growth the early phases of development is to be expect Amelioration of basic living conditions, such as creased food supplies and improved nutrition, a advances in knowledge and technology applied in fields of public health and medicine, as developm gets under way, are to a large extent responsible for acceleration of population growth through a ra reduction of mortality. Historical trends in the curren developed countries in general tended to conform to t pattern. Population growth in the majority of the countries accelerated notably in the nineteenth centu as they embarked upon their development. However, t acceleration of population growth, brought about declining death rates and stable birth rates, represen only one phase in a broader process of demograph evolution, generally known as the demographic tran tion. A number of influences, such as changes in e ucational attainment, the rising status of women a shifts in the role of the family and its individu members, all related to the process of modernization, turn caused fertility to decline. Declining birth rates th halted and eventually reversed the trends towar increasing population growth rates, re-establishing balance between births and deaths at low levels.

9. On the whole, the developing countries entere the stage of rapid mortality decline some two decad ago, and it is this demographic evolution since the which is the major source of concern. Apprehensior about the implications for development of recent de mographic trends in these countries are caused not s much by the acceleration of population growth as such which was to be expected, as by the magnitude of th

* For the report of the Symposium on Population and Development, Cairo, 4-14 June 1973, see *Population Debate*, vol. II, annex I.

increase. High fertility and a rapid decline of mortality over the past decades in these countries made for an acceleration and for current levels of population growth which bear little comparison to past trends in the developed countries. For the latter as a group, the annual rate of growth of population over longer periods was only a little more than 1.0 per cent and probably never exceeded 1.5 per cent. Population growth in the developing countries was about 0.5 per cent per annum in the first decades of this century, climbed to 1 0 per cent or somewhat more between 1920 and 1950, and soared to over 2 per cent in the 1950s and 1960s By 1970, population in these countries was increasing at 2 4 per cent per annum, a rate which implies a doubling in less than 29 years. In many individual countries, growth rates were even higher, attaining levels at which population would double in 25 years or less Continued growth at these levels would pose serious problems, but as has already been mentioned, there is little reason to assume the continuation of current trends.

10 In considering the attenuation of population growth, it should be kept in mind that in terms of human welfare and the quality of life, of the two extreme ways of achieving low population growth rates, namely the high mortality-high fertility pattern and the low mortality-low fertility pattern, only the latter is acceptable. The reduction of mortality and morbidity is a fundamental condition and element of well-being for both the individual and society and an essential goal of any development policy. The overwhelming advantages of the low mortality-low fertility alternative and the socio-economic conditions consistent with this pattern are obvious. Once mortality rates have declined and population growth accelerated, no one would argue that a sensible way of returning to lower rates of population growth is through raising mortality Only lower fertility can reasonably be sought as an answer if rapid population growth is deemed to be undesirable, and it is in fact already observed in some developing countries

11. There is much conflict of opinion about the exact details of the process responsible for fertility decline, and different experts emphasize different combinations of influences. Despite these disagreements, historical experience and observable current trends provide an over-all generalization that can hardly be denied every population that has experienced the impact of economic and social development has undergone a demographic evolution in the course of which fertility, as well as mortality, has declined drastically. Although, apparently, modernization ultimately establishes the conditions for fertility decline, there is a growing body of evidence that reductions in fertility can also occur in communities which are scarcely affected by modernization. It is also important to note that where fertility has declined, it has done so as a result of individual decisions on the part of families, which were in the past unsupported by, and often in the face of resistance from Governments, religious institutions and other centres of authority. In addition, where fertility declines occurred first, they were achieved without the mass dissemination of modern contraceptives

12. There is little reason to assume that development, which has been highly conducive to fertility declines in the past, would not have the same effect in countries where fertility remains high. In fact, it is widely agreed that a reduction of the high fertility levels still prevailing among populations which have maintained traditional patterns as a way of life and, as a consequence, traditional fertility levels, is most likely to occur in response to socio-economic development. In so far as developing countries have embarked on the process of development, and as strategies and policies designed to achieve higher levels of living, consumption and social well-being are successful, they are bound to affect, in differing degrees, fertility and population trends

13. Modernization has already been initiated in a number of developing countries, and reductions in birth rates, some of them substantial, have been realized in at least a score of them. There are also indications that, as in the past, fertility has declined in some developing countries or communities which are still in the very early phases of modernization. It is not yet clear to what extent policies designed to affect fertility, and the availability of modern contraceptive techniques, may help in lowering birth rates in the developing countries. It is generally agreed that such policies cannot by themselves solve the major problems. However, no findings contradict the common-sense hypothesis that while motivation is a prerequisite, knowledge and access to means of effective fertility control may hasten the fertility decline

14. Even though there is a presumption that with continued development population growth may slow down, the momentum of prevailing demographic trends is considerable and population projections point to large future increases in numbers There is a clear prospect that the world population will increase from its current size of close to 3 9 thousand million to between 6 thousand million and 7 thousand million by the end of the century Although under the "low variant" of United Nations population projections, population growth in the less developed regions would slow down significantly in the coming decades, the population of these regions would still increase from about 2.5 thousand million in 1970 to somewhat over 4.8 thousand million in the year 2000.

15. There is far from full agreement on all the implications of population growth for economic and social development, despite the large volume of research that exists There is a wide range of views, the limits of which are set by two extreme positions The first of these is the view that the current high rates of population growth constitute an insurmountable obstacle to social and economic development, by exerting an unfavourable influence on the availability and mobilization of the resources needed for development On the other hand, there is the view that, given the pre-

of certain social and economic policies, a larger population can in fact be beneficial, or at least not an obstacle, to development. However, there is also to be found a middle ground and an intermediate position held by those who recognize the potential benefits from population growth, but who also see in high rates of population increase a serious impediment to socio-economic development even in areas which would benefit from a larger population attained more gradually.

16. The degree of concern over the economic and social implications of population growth varies, as may be expected, not only with the rates of such growth but with the size of the country, natural resources endowment, initial income *per capita*, industrial structure, education and skill levels, possibility of participation in world markets, and, not least, cultural, social and political conditions and factors. The demographic evidence compiled by the United Nations, coupled with the available economic and social information, indicates a considerable diversity of situations in the various regions of the world.

17. In the developed countries, current rates of population growth are comparatively low. This does not mean that these countries have no population problem. It is true that in recent years the relatively modest growth of population in these countries, 1.1 per cent per annum, during the 1960s, has further slowed down. In a number of them, fertility has declined to, or is approaching, the replacement level, causing in some instances, where this development is considered undesirable, preoccupation with the need to stimulate birth rates. In addition, problems arising out of the progressive geographical concentration of population, with nearly two thirds living in urban areas, are becoming a source of increasing concern. So are the shifts in age composition associated with the slowing down of population growth, including the increasing burden of aged dependants and the aging of the working population.

18. Turning to the question of the specific economic and social effects of population growth, it must be noted that there appears to be a better comprehension of the general nature of the impact of economic and social development on population than of the implications of demographic trends for development. That population growth cannot be assumed, without further argument, to impede economic growth and social progress is evident already from the historical record. The upswing in population growth in the now developed countries was associated with an acceleration of economic growth. It is not obvious that early industrial change would have been faster if population had grown more slowly. It is possible that population growth made a positive contribution, although it is also quite conceivable that the rate of population growth was not a very important factor. However, it is often held that the more rapid increase of population of these countries was at the same time a condition for, as well as a result of, their economic growth and development.

19. Of course, developing countries now f themselves in conditions which, apart from their m rapid population growth, are in many other respects qu different from those of the currently developed countr at the beginning of their industrialization. Neverthele there may be a certain analogy between present and p as concerns the positive link between population grow and development. The past few decades have been n only a period of very rapid population growth in t developing countries but one of substantial econor and social progress. Bearing in mind that the implic tions of population trends are likely to manifest the selves in the longer term, rather than the short run, fro the post-war record of the developing countries it is no means evident that those with lower rates of popu tion growth have developed more speedily or efficient or that high rates of population increase have becom inconsistent with development at a fairly rapid pac However, the statistical record also indicates that most aspects of development the developing countr have not been able to reduce the gaps that separate the from the developed countries. In fact, with only a fe exceptions, these gaps have been widening, in part a result of faster population growth in the developi countries. It would also appear from recent trends th certain developmental aspects may be adversely affecte even in the short term, by the rapid rates of populatio growth characteristic of the developing countries. T absence of a close statistical correlation between popul tion growth and socio-economic development should n be surprising. It may be explained by many factor including the widely diverging demographic, econom and social conditions and trends in different regions ar countries; the multiplicity of factors affecting develo ment; and, as mentioned before, by the predominant long-term nature of the influences exerted by populatio trends.

20. The implications of demographic factors fo economic and social development arise out of the du role of population as producer and consumer. Th impact of population on levels and conditions of livin thus depends upon the balance of forces which th growth, composition and distribution of populatio exerts on the society's demand for, and supply an distribution of, goods and services. The net effect of th different influences involved is the outcome of an almos infinitely complex network of associations linking pop ulation trends and characteristics to the numerou relevant economic, social and institutional variables.

21. Population growth is evidently associated wit higher levels of demand, even if potential rather tha effective, and its relative impact on the demand side usually assessed in terms of specific needs and require ments, such as food, educational and health facilitie and housing, has been found to be substantial, especiall in the developing countries. In order to maintain, as a minimum, the prevailing levels of living, the total outpu and the production of consumer goods and service should, at the least, expand as fast as population, taking

nto account its composition and distribution Apprehensions about the rapid growth of population in the developing countries are based on the contention that the increasing demand it engenders will not be matched by an expansion of productive capacity sufficient to raise, or even maintain, their already low levels of living

22 The fundamental issue, which has dominated the post-war discussion of the impact of population on development, has been the effects of demographic trends in the developing countries on their economic growth By means of analytical studies and projections, it has been shown that rapid population growth and the characteristics accompanying it, particularly the young age distribution, place a heavy burden on the economy and its resources. The rapid increase in numbers has absorbed resources which otherwise would have been available for raising levels of living Conversely, there is little ground to assume, as has been brought out in a number of mathematical models, that under given assumptions population growth would increase the productive capacity of the economy enough to compensate for the faster growth of population The positive effects of a more rapidly expanding labour force, induced by high population growth, would be counteracted by the increasing pressure of population on other, scarce resources. Although the validity of these findings has been questioned for a number of reasons, there is a strong presumption that under the assumptions made and in assumed development contexts, existing demographic trends in the developing countries appear not to have been conducive to a more rapid pace of development.

23 A better understanding of the relationship between population and development requires an explicit recognition of the interrelated nature of the processes involved There is a two-way relationship between them, and an increased knowledge of the impact of population trends on development, of the role of economic and social developmental factors in shaping demographic patterns and trends and of the mutual relations and interactions between the two is an important element in the formulation and implementation of both development and population policies In the absence of a comprehensive analytical framework in which the interdependence between demographic and economic and social variables is explicitly specified, the population-development problems may be posed in terms of three fundamental questions

(*a*) What are the prospects for a fertility decline and a consequent slowing down of population growth in the developing countries as development proceeds,

(*b*) The extent to which current and prospective population trends in the developing countries hamper their development and consequently postpone the onset of fertility decline;

(*c*) The conclusions that can be drawn about the action-oriented and policy implications of these findings. The remainder of this report addresses itself to these questions, although it does not presume to answer them As has already been mentioned, few issues of social and economic change are more complex than those relating to population, and it should therefore be expected that, although a broadening area of consensus is emerging, the knowledge of some of the most fundamental questions remains far less than complete

EFFECTS OF ECONOMIC AND SOCIAL DEVELOPMENT ON POPULATION TRENDS

24 There is a growing body of scientific knowledge about the impact of economic and social development on population trends and variables, much of it based on the historical record When the evidence on population movements in the past is combined with what is known about contemporary economic and social conditions and trends, what emerges is a fairly coherent picture of: (*a*) the dynamics of population growth; and (*b*) the basic historical relations between population and economic and social change Despite the enormous variety of conditions and trends, and the differences of perception with regard to them, a broad agreement on the fundamental issues exists

Population in perspective

25 On the population side, the basic generalization has become known as the demographic transition A broad outline of the transition process, based mainly on the historical experience of western European countries, but deliberately simplified to bring out the general patterns, shows the following features.

(*a*) An initial situation in the late eighteenth and early nineteenth centuries of relatively high birth and death rates of the order of 35-40 per 1,000 and average annual population growth rates not exceeding 0 5 per cent Historically, birth and death rates had been unstable Spurts of population growth were interrupted by frequent crop failures and food shortages, as well as by epidemics, warfare and civil strife, with death rates often soaring to two or three times their normal level;

(*b*) During the early process of modernization, but at different times in different populations, the conditions and opportunities arose for a gradual decline in mortality In most cases, fertility did not decline for some time, or when it did, the reductions in birth rates were not of equal magnitude to those in death rates. The result was a general increase of population growth. Towards the last third of the nineteenth century, the gaps between birth and death rates produced annual growth rates of 1 per cent or more, unprecedented in comparison with the previously known sustained rates of growth,

(*c*) In the course of time, however, a fertility decline took place. Under the influence of modernization, the changing role of the family and declining mortality, a new ideal of the small family arose. As birth rates began their descent, growth rates first stabilized and then declined, as the number of births increased more slowly than those of deaths. The [illegible]

demographic cycle signified the return to an initial condition of low population growth, but this time under a régime of the low levels of fertility and mortality characteristic of modern society, as opposed to the high fertility and mortality patterns typical of the traditional, pre-industrial society. [2]

26. Some qualifications to this broad picture are called for. In the first place, there were significant differences in fertility and mortality among pre-modern societies. In particular, in western Europe, birth rates were already comparatively low when industrialization began, mainly because of an unusual pattern of marriage. This so-called "European marriage pattern", which reaches back into the Middle Ages, involved the postponement of marriage until the mid-twenties or even later, as well as a high incidence of permanent spinsterhood, which kept as many as 50 per cent of the women of child-bearing age from exposure to the risk of fertility. Western Europe, it has been asserted, experienced two transitions. The first, from early and universal marriage to the western European nuptiality pattern, occurred well before the industrial revolution. The other was a reduction in marital fertility, which varied considerably although maximum rates were almost never observed and fertility was controlled to some degree by various means. [3] In the second place, within the experience of the developed countries, cases can be found where fertility declined simultaneously with, or even before, the reduction in mortality. The moderate rate of population growth in the late eighteenth century in France, for instance, scarcely accelerated during the transition, as the declines in death rates during the nineteenth century were countered by reductions in the birth rate that occurred at the same time. There are indications that in certain areas in the developed countries, an example being Germany, fertility may have declined prior to mortality. [4] Although it is often held that in most countries birth rates fell in about 50 years to half the level prevailing at the time of the onset of fertility decline, historical trends have shown that the transition itself and its pattern, sequence and timing may vary greatly from country to country and over time. One feature which has emerged in this context is that the transition appears to have been more rapid in those countries where it began later. As a rule, mortality declined much faster in those countries where the process began later; and so did fertility, as exemplified by the experience of southern and eastern European countries and Japan, where the major changes associated with the transition did not take place until the twentieth century.

27. The universality of the demographic transition created a strong presumption that a similar process to that in the industrialized countries would occur in the developing ones. As predicted by the authors of the transition theory, the developing countries began to experience a rapid expansion of their populations in the post-war years as mortality declined steeply and fertility remained more or less unchanged. However, there are numerous differences between past and present, and the analogy is much less than complete. As has already been mentioned, current rates of population growth in the developing countries are much higher than those historically observed in the developed countries during their period of accelerated growth. Several factors are involved:

(*a*) In many of the developed countries, fertility levels at the time mortality began to decline were already well below traditional and current levels observed in the developing countries. Fertility in almost all societies is considerably below its potential and is restrained by the institutions surrounding sex, family formation and childbirth. [5] However, in part because of the European pattern of marriage, which contrasts sharply with the early and universal marriage characteristic of the developing countries, fertility in the latter was much higher. It has been estimated that the typical birth rates of western European countries around the middle of the nineteenth century, that is, prior to their major declines in fertility, were about 35 per 1,000 or less, [6] compared with an average birth rate of nearly 44 per 1,000 in the less developed regions in the early 1950s. [7]

(*b*) Mortality in the past declined slowly and gradually, as opposed to the precipitous decline in death rates in the developing countries in recent decades. Average crude death rates in the less developed regions were reduced from an estimated 29-34 per 1,000 in 1935-1939 to 16 per 1,000 in 1965-1970; [8]

(*c*) In the currently developed countries, the major gains in life expectancy often occurred only after the onset of fertility decline; whereas in most but not all developing countries, fertility levels have decreased little or not at all in recent decades;

(*d*) Lastly, while the countries of early development could rely on emigration as an outlet for excessive population growth, such opportunities are currently negligible. [9]

The question arises whether, despite these differences, the historical experience of the developed countries still has relevance for the currently developing countries. An answer to this question can be found only by considering

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[2] "Report of the Symposium on Population and Development", *Population Debate*, vol. II, annex I, paras. 22-23.

[3] Ansley J. Coale, "The demographic transition", *Population Debate*, vol. I, part two.

[4] *Ibid.*, paras. 21-22.

[5] On differences and variations of fertility in pre-modern societies, see, for example, R. A. Easterlin, "Fertility and the theory of household choice" (E/CONF.60/SYM.I/12), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

[6] Paul Bairoch, "Tendances démographiques et développement industriel dans une perspective historique", *Population Debate*, vol. I, part four, table 3.

[7] United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 5.

[8] *Ibid.*, para. 22.

[9] United Nations Secretariat, "Major economic and social correlates of demographic trends, 1950-1970", *Population Debate*, vol. I, part four.

the determinants of past demographic changes and their pertinence to current conditions.

Economic and social determinants of fertility and mortality

28. It is widely recognized that there was and is a general coherence between demographic change and the fundamental economic and social developments in the course of modernization. This view was reflected in several of the papers contributed to the Symposium on Population and Development. Historically, it has been noted, the relations between demographic change and the process of industrial and agricultural development have always been close The industrial revolution, and the agricultural revolution which was an integral part of it, not only profoundly affected the systems of production, but also fundamentally altered the demographic evolution.[10] Changes in the modes of production, resulting from the growth and modernization of productive forces and instruments, according to a similar view, change the entire social system, including, through numerous intermediate factors and relationships, the historical patterns in the reproduction of population.[11] Economic growth processes of a given historical epoch, it was noted, will have specific effects on the demographic processes and structures, and modern economic growth in particular has provided the opportunities for a great reduction in death rates and the inducements and requirements for a marked reduction in birth rates and the spread of the small nuclear family.[12]

29. The transition to low levels of both fertility and mortality is thus regarded as an integral part of the transformation in economic and social organization usually referred to as modernization As far as the mortality decline in the currently developed countries is concerned, the history of their socio-economic development has been characterized by certain persistent features conducive to lower death rates. Among the most important are the stream of inventions and innovations which revolutionized productive processes, the simultaneous increase in education, advances in medical knowledge and the gradual spread of their application, improvements in sanitation and public health measures; less strenuous working conditions; the increased capacity to store and transport food and other goods, and increases in income per family. All of these led to an increase in average duration of life through a reduction of mortality rates at all ages, but especially in infancy and childhood. Together with other factors, the industrial revolution that took place at the end of the eighteenth and the beginning of the nineteenth century created the conditions for, and contributed significantly to, the process of mortality reduction in the countries of early development. However, as has been noted elsewhere,[13] three phases can be distinguished in their mortality transition The first phase was one of slow and irregular progress from primitive to somewhat better conditions, which allowed for an initial decline in mortality. The most substantial gains were made during the second phase, characterized by a sustained and rapid decline in mortality to a low level, which took place in the currently developed countries only after they had been embarked on the development process for a considerable period of time Progress was again slow in the third stage as the limit to further gains in life expectancy was approached.

30 Improvements in general living conditions have contributed much to the reduction of mortality in developing countries, as they once did in the industrialized countries. In spite of shortages in some areas, particularly inaccessible regions, food supplies have become more certain and regular, and famines less frequent than they used to be. At the same time, *per capita* income in the developing countries has increased, also contributing significantly to lower mortality rates Above all, however, mortality has been reduced through the remarkable success in controlling epidemic disease by relatively simple public health measures, elementary hygiene and improved maternal and child care. The decline in mortality in developing countries is both more conspicuous and more uniform than the strictly economic improvements in living conditions. It is, therefore, reasonable to conclude that advances in knowledge and technology applied in the fields of medicine and public health, such as new insecticides and other techniques, are to a large extent responsible for the reduction of mortality. It was this combination of factors which made possible the exceptional decline in death rates in the second phase of the mortality transition in the developing countries after the 1940s.

31. There are differences of opinion about the specific factors which caused fertility to decline in those countries where it is now low. Despite disagreement on details, there is general concurrence that a persistent process of modernization contains within it the seeds of the attenuation of the extended family and a shift in the pattern of social relationships within which incentives towards relatively small nuclear families developed Modern economic growth, where it has occurred, has manifested itself through profound changes in the organization, functioning and structure of the economy and the society. Some of these correlates of modern economic growth are: the introduction and large scale application of innovations based on the spread of empirical science and knowledge in the production process and its organizations, a great increase in the scale of the average enterprise, a persistent shift in the balance of production towards non-agricultural

[10] P Bairoch, *loc cit*, para 29-30

[11] Yaropolk N. Guzevatyi, "Economic and social determinants of contemporary demographic behaviour", *Population Debate*, vol I, part four, para 3

[12] Simon Kuznets, "Population trends and modern economic growth notes towards a historical perspective", *Population Debate*, vol I, part four, paras 2 and 13

[13] See "Recent population trends and future prospects' report of the Secretary-General", *Population Debate*, vol I para 57

activities; and associated shifts in the locale of production and of population from rural to urban areas. [14]

32. These changes in turn implied profound changes in the role, traditional structure and relationships of the family and the individual. Modern economic growth and structural changes led to an increased occupational and spatial mobility from one generation to the next; economic activity was removed to a large extent from the family with the rise of the large-scale non-personal enterprise; the economic modernization signified a sharp increase in educational and skill requirements. These forces created the attitudes, motivations and conditions conducive to a decline in fertility. Among the specific characteristics of modern economic growth usually considered as facilitating, if not causing, the decline of fertility are: non-agricultural employment and urban residence; increasing school attendance and rising levels of education; the reduced importance of child labour; the diminished role of the family in production and the decreasing importance of the extended family; the emancipation of women and their increasing participation in economic and other activities outside the house. [15] Studies on the subject have almost universally found that low fertility is associated with high income, high education, high status of women and urban occupations.

33. Recently, considerable work has been done on the economics of fertility and attempts have been made to formulate a socio-economic theory of fertility. [16] The results of studies along these lines confirm the findings of others, but with a different interpretation. First, the emphasis is on the demand for children as a function both of the cost of having them and of the income of the household. Second, mortality takes its place as an important determinant of fertility. Parents, it is argued, are not so much concerned with the number of children born as with the number of those surviving. The decline in mortality, particularly pronounced in the early stages of modernization, disrupts the more or less stable traditional demographic pattern in which only a few of the children born survive. As infant and childhood mortality declines, it takes fewer births to reach the desired family size, thus providing a motive for reducing the number of births. Moreover, if infant and child mortality are reduced while fertility remains unchanged, the increased number of surviving children will place a greater strain on the resources of the household. Increasing family size may by itself constitute an economic pressure, but the strains are likely to manifest themselves particularly by a number of economic and social changes associated with industrialization and modernization.

34. Many of these changes have to do with the rising expectations fostered by development. Parents want to provide better lives for their children, including a better education, and aspire to higher levels of living for th[e] family. The returns from education increase wi[th] development, but so do its costs. On the other han[d] the importance of the economic contribution of childr[en] as income earners and as a source of support for the[ir] parents in old age declines as development progresse[s]. The greatly increased cost of children, resulting in pa[rt] from their withdrawal from the labour force and i[n] part from the requirement for a longer and more ex[-] pensive span of education and training, has been a[n] important factor in the decline of fertility. Of perhap[s] equal importance has been the changing status o[f] women. Lower fertility has provided women wit[h] opportunities for genuine emancipation and for person[al] development. The increasing range of employmen[t] opportunities outside the home has meant that th[e] increase of income forgone in maternal care become[s] a vital factor in fertility behaviour. From this theory[,] of which only a broad outline is sketched here, [a] consistent interpretation of the historical experience o[f] the demographic transition appears to emerge.

35. However, while modern economic growth create[d] the conditions for declining birth as well as death rates[,] opportunities were not so free of obstacles nor wer[e] inducements so predominant as to bring about a perfec[t] response in demographic trends. In some of the countries of early development, for instance, the initial decline of mortality was followed by a period in which death rates remained virtually stable. In many cases, the major gains in life expectancy of the second phase of mortality decline, referred to earlier, occurred only late in the nineteenth or early in the twentieth century, well after modern economic growth was initiated. [17] In the case of fertility, as has already been mentioned, birth rates appear to have fallen prior to modernization in some instances. But such examples in no way contradict the proposition that modernization facilitated the fertility and mortality declines. Even though the demographic transition was neither prompt nor smooth, but marked by lags and fitfulness, its broad outlines conform to what an interpretation in terms of economic and social development should lead one to expect. However, because of the variety of conditions and trends, it is not possible to formulate a precise list of quantitative values of social and economic indicators identified with a start in fertility decline and, in the absence of such quantification, views on the importance of specific factors appear irreconcilable. Nevertheless, sustained modern economic growth and social development as such are unquestionably significant forces in the decline of fertility. Although the weakness of the concept of transition is that it does not tell what degree, if any, of modernization is necessary to produce a fall in fertility, [18] the fact remains that every population that has experienced the impact of modernization has much lower fertility and mortality than before it was subject to such economic and social development.

[14] S. Kuznets, *loc. cit.*; "Report of the Symposium on Population and Development", *loc. cit.*, para. 25.

[15] S. Kuznets, *loc. cit.*; Y. N. Guzevatyi, *loc. cit.*, para. 13.

[16] See R. A. Easterlin, *op. cit.*

[17] S. Kuznets, *loc. cit.*, para. 5.

[18] A. J. Coale, *loc. cit.*, para. 44.

36. Despite the differences between past and present, and the impossibility of determining, on the basis of the current stage of knowledge, the quantitative importance of different economic and social factors in fertility decline, the relevance of the lessons of the past remains. There is every reason to believe that the modernization of the currently developing countries will eventually lead to sustained fertility decline The decline of fertility in southern and eastern Europe, as well as in western Europe, in sparsely settled Argentina and Australia, as well as in densely populated Belgium and the Netherlands; the similar population trends in developed socialist and non-socialist countries; the completion of the demographic transition in Japan and its initiation in the Republic of Korea, Cuba and other countries in South-East Asia and the Caribbean. All confirm the view that socio-economic development facilitates a reduction in fertility.[19] The diversity of circumstances in which marital fertility has declined, however, may arise from the existence of more than one pre-condition for decline. Three general conditions can be considered to have been essential for a major reduction in marital fertility: (*a*) the regulation of fertility, after weighing the advantages and disadvantages of additional births, must be an accepted mode of behaviour, (*b*) lower fertility must be perceived by individual couples as advantageous to both parents and children; and (*c*) there must be adequate knowledge and acceptance of means of reducing fertility, sufficient communication between spouses and the will to use the available means [20]

37. These conditions are found in every society at an advanced stage of socio-economic development. However, historical experience also indicates that they have existed in less developed areas of Europe that were at the time agrarian and low in literacy and where the only means of fertility control available were folk methods. Apparently, it has been noted, modernization ultimately establishes the conditions for fertility decline, but there is evidence that they may also exist in communities which are relatively little modernized.[21] With regard to the third condition, it should be mentioned that knowledge of modern techniques or large-scale family-planning programmes are not necessary. In countries of early transition, the reductions in fertility were accomplished mainly by means of the traditional folk methods.[22] Some of the recent fertility declines also began before attempts to spread information about contraceptive methods and make them available were started Conversely, many family planning campaigns have so far had only a very limited impact on fertility. This historical and contemporary experience suggests that motivation to restrict fertility is more important than access to modern techniques of birth control But although motivation is a prerequisite, it is reasonable to believe that family planning and educational programmes and efforts to make contraception simple, attractive and inexpensive to practice may hasten the decline of fertility.[23] This would seem to be borne out by studies of those family planning programmes which have been effectively implemented The findings of these studies indicate that the downward turns in fertility which had occurred could not be attributed to these programmes, but that such programmes accelerated the decline

38 The relevance of the three basic conditions for fertility decline to an understanding of the trends of today's developing countries is as follows: (*a*) their universal prevalence in developed societies demonstrates the importance of social and economic development in facilitating the reduction of fertility; and (*b*) their occasional existence in populations that have not yet experienced social and economic development suggests that population policies designed to reduce fertility need not be postponed to the later stages of development and may in fact be reinforced by acceptance of recently developed, more effective means of fertility control associated with family planning services Historical as well as contemporary experience supports the widely held view that policies designed to influence population trends should be an integral part of general development strategy.[24]

39. The need for such an integrated approach to population policies was emphasized in the papers contributed to the Symposium on Population and Development and in its report. In appraising these policies, it was noted that development cannot be planned without due consideration of demographic factors and without attempting to influence them with a view to achieving the most favourable combination of population change and economic and social progress. Moreover, such policies should not be considered only from a demographic-economic point of view: as a rule, they are an important part of a system of measures in the field of child and maternal welfare, which includes also the reduction of high infant and maternal mortality.[25] Such an appraisal also implies that population policies must be geared to, and cannot be a substitute for, economic and social development programmes.[26] This view was also brought out in the report of the Symposium which emphasized that population policies by themselves would not solve the problems of development, but that together with and as part of other policies they could contribute to such a solution.[27]

[19] "Report of the Symposium on Population and Development", *loc cit*, para 31

[20] A J Coale, *loc cit*, para 31

[21] *Ibid*; Frank W. Notestein, "Population policy and development a summary view", *Population Debate*, vol I, part four, paras 27-28

[22] "Report of the Symposium on Population and Development", *loc cit*

[23] A J. Coale, *loc cit*, paras 42-44, F Notestein, *loc. cit*, para 33

[24] "Report of the Symposium on Population and Development", *loc cit*., para. 31

[25] Y N Guzevatyi, *loc. cit*, para 25

[26] *Ibid*; Jósef Pajestka, "Population and development in perspective, with particular reference to the Second United Nations Development Decade", *Population Debate*, vol. I, part four, para 13, F. Notestein, *loc. cit*, para 25.

[27] "Report of the Symposium on Population and Development", *loc cit*, para 73

activities; and associated shifts in the locale of production and of population from rural to urban areas.[14]

32. These changes in turn implied profound changes in the role, traditional structure and relationships of the family and the individual. Modern economic growth and structural changes led to an increased occupational and spatial mobility from one generation to the next; economic activity was removed to a large extent from the family with the rise of the large-scale non-personal enterprise; the economic modernization signified a sharp increase in educational and skill requirements. These forces created the attitudes, motivations and conditions conducive to a decline in fertility. Among the specific characteristics of modern economic growth usually considered as facilitating, if not causing, the decline of fertility are: non-agricultural employment and urban residence; increasing school attendance and rising levels of education; the reduced importance of child labour; the diminished role of the family in production and the decreasing importance of the extended family; the emancipation of women and their increasing participation in economic and other activities outside the house.[15] Studies on the subject have almost universally found that low fertility is associated with high income, high education, high status of women and urban occupations.

33. Recently, considerable work has been done on the economics of fertility and attempts have been made to formulate a socio-economic theory of fertility.[16] The results of studies along these lines confirm the findings of others, but with a different interpretation. First, the emphasis is on the demand for children as a function both of the cost of having them and of the income of the household. Second, mortality takes its place as an important determinant of fertility. Parents, it is argued, are not so much concerned with the number of children born as with the number of those surviving. The decline in mortality, particularly pronounced in the early stages of modernization, disrupts the more or less stable traditional demographic pattern in which only a few of the children born survive. As infant and childhood mortality declines, it takes fewer births to reach the desired family size, thus providing a motive for reducing the number of births. Moreover, if infant and child mortality are reduced while fertility remains unchanged, the increased number of surviving children will place a greater strain on the resources of the household. Increasing family size may by itself constitute an economic pressure, but the strains are likely to manifest themselves particularly by a number of economic and social changes associated with industrialization and modernization.

34. Many of these changes have to do with the rising expectations fostered by development. Parents want to provide better lives for their children, including a better education, and aspire to higher levels of living for the family. The returns from education increase with development, but so do its costs. On the other hand, the importance of the economic contribution of children as income earners and as a source of support for their parents in old age declines as development progresses. The greatly increased cost of children, resulting in part from their withdrawal from the labour force and in part from the requirement for a longer and more expensive span of education and training, has been an important factor in the decline of fertility. Of perhaps equal importance has been the changing status of women. Lower fertility has provided women with opportunities for genuine emancipation and for personal development. The increasing range of employment opportunities outside the home has meant that the increase of income forgone in maternal care becomes a vital factor in fertility behaviour. From this theory, of which only a broad outline is sketched here, a consistent interpretation of the historical experience of the demographic transition appears to emerge.

35. However, while modern economic growth created the conditions for declining birth as well as death rates, opportunities were not so free of obstacles nor were inducements so predominant as to bring about a perfect response in demographic trends. In some of the countries of early development, for instance, the initial decline of mortality was followed by a period in which death rates remained virtually stable. In many cases, the major gains in life expectancy of the second phase of mortality decline, referred to earlier, occurred only late in the nineteenth or early in the twentieth century, well after modern economic growth was initiated.[17] In the case of fertility, as has already been mentioned, birth rates appear to have fallen prior to modernization in some instances. But such examples in no way contradict the proposition that modernization facilitated the fertility and mortality declines. Even though the demographic transition was neither prompt nor smooth, but marked by lags and fitfulness, its broad outlines conform to what an interpretation in terms of economic and social development should lead one to expect. However, because of the variety of conditions and trends, it is not possible to formulate a precise list of quantitative values of social and economic indicators identified with a start in fertility decline and, in the absence of such quantification, views on the importance of specific factors appear irreconcilable. Nevertheless, sustained modern economic growth and social development as such are unquestionably significant forces in the decline of fertility. Although the weakness of the concept of transition is that it does not tell what degree, if any, of modernization is necessary to produce a fall in fertility,[18] the fact remains that every population that has experienced the impact of modernization has much lower fertility and mortality than before it was subject to such economic and social development.

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[14] S. Kuznets, *loc. cit.*; "Report of the Symposium on Population and Development", *loc. cit.*, para. 25.

[15] S. Kuznets, *loc. cit.*; Y. N. Guzevatyi, *loc. cit.*, para. 13.

[16] See R. A. Easterlin, *op. cit.*

[17] S. Kuznets, *loc. cit.*, para. 5.

[18] A. J. Coale, *loc. cit.*, para. 44.

36 Despite the differences between past and present, and the impossibility of determining, on the basis of the current stage of knowledge, the quantitative importance of different economic and social factors in fertility decline, the relevance of the lessons of the past remains. There is every reason to believe that the modernization of the currently developing countries will eventually lead to sustained fertility decline. The decline of fertility in southern and eastern Europe, as well as in western Europe, in sparsely settled Argentina and Australia, as well as in densely populated Belgium and the Netherlands; the similar population trends in developed socialist and non-socialist countries; the completion of the demographic transition in Japan and its initiation in the Republic of Korea, Cuba and other countries in South-East Asia and the Caribbean. All confirm the view that socio-economic development facilitates a reduction in fertility.[19] The diversity of circumstances in which marital fertility has declined, however, may arise from the existence of more than one pre-condition for decline Three general conditions can be considered to have been essential for a major reduction in marital [illegible] must be perceived by individual couples as advantageous to both parents and children; and (*c*) there must be adequate knowledge and acceptance of means of reducing fertility, sufficient communication between spouses and the will to use the available means.[20]

37. These conditions are found in every society at an advanced stage of socio-economic development. However, historical experience also indicates that they have existed in less developed areas of Europe that were at the time agrarian and low in literacy and where the only means of fertility control available were folk methods. Apparently, it has been noted, modernization ultimately establishes the conditions for fertility decline; but there is evidence that they may also exist in communities which are relatively little modernized.[21] With regard to the third condition, it should be mentioned that knowledge of modern techniques or large-scale family-planning programmes are not necessary. In countries of early transition, the reductions in fertility were accomplished mainly by means of the traditional folk methods.[22] Some of the recent fertility declines also began before attempts to spread information about contraceptive methods and make them available were started Conversely, many family planning campaigns have so far had only a very limited impact on fertility. This historical and contemporary experience suggests that motivation to restrict fertility is more important than access to modern techniques of birth control. But although motivation is a prerequisite, it is reasonable to believe that family planning and educational programmes and efforts to make contraception simple, attractive and inexpensive to practice may hasten the decline of fertility.[23] This would seem to be borne out by studies of those family planning programmes which have been effectively implemented The findings of these studies indicate that the downward turns in fertility which had occurred could not be attributed to these programmes, but that such programmes accelerated the decline.

38 The relevance of the three basic conditions for fertility decline to an understanding of the trends of today's developing countries is as follows (*a*) their universal prevalence in developed societies demonstrates the importance of social and economic development in facilitating the reduction of fertility, and (*b*) their occasional existence in populations that have not yet experienced social and economic development suggests that population policies designed to reduce fertility need not be postponed to the later stages of development and may in fact be reinforced by acceptance of recently developed, more effective means of fertility control associated with family planning services Historical as well as contemporary experience supports the widely held view that policies designed to influence population trends should be an integral part of general development strategy.[24]

39. The need for such an integrated approach to population policies was emphasized in the papers contributed to the Symposium on Population and Development and in its report. In appraising these policies, it was noted that development cannot be planned without due consideration of demographic factors and without attempting to influence them with a view to achieving the most favourable combination of population change and economic and social progress. Moreover, such policies should not be considered only from a demographic-economic point of view· as a rule, they are an important part of a system of measures in the field of child and maternal welfare, which includes also the reduction of high infant and maternal mortality[25] Such an appraisal also implies that population policies must be geared to, and cannot be a substitute for, economic and social development programmes.[26] This view was also brought out in the report of the Symposium which emphasized that population policies by themselves would not solve the problems of development, but that together with and as part of other policies they could contribute to such a solution[27]

[19] "Report of the Symposium on Population and Development", *loc cit*, para 31

[20] A J. Coale, *loc. cit*, para 31

[21] *Ibid*; Frank W. Notestein, "Population policy and development a summary view", *Population Debate*, vol. I, part four, paras 27-28

[22] "Report of the Symposium on Population and Development", *loc cit*

[23] A J Coale, *loc cit*, paras 42-44, F Notestein, *loc cit*, para 33

[24] "Report of the Symposium on Population and Development", *loc cit*, para 31

[25] Y. N Guzevatyi, *loc cit*, para 25

[26] *Ibid*, Józef Pajestka, "Population and development in perspective, with particular reference to the Second United Nations Development Decade", *Population Debate*, vol I, part four, para 13, F Notestein, *loc. cit*, para 25

[27] "Report of the Symposium on Population and Development", *loc cit*, para 73

40. There is evidence that birth rates in a number of developing countries have declined substantially. Data for the 1960s reveal a significant reduction of birth rates in at least 14 countries, but declines have apparently occurred recently in various other developing countries although they are not yet fully documented. [28] There are also indications that the beginning of a fertility decline may have occurred in predominantly agricultural countries (such as Sri Lanka) or areas (the Punjab in India) which have experienced substantial economic growth. [29] Many demographers believe that a fertility transition is latent or imminent in other developing countries where birth rates have not yet turned down. This impression is based in part on surveys of attitudes to family size and the practice of family planning which show that the ideal size of the family is generally smaller than the actual size and that persons in younger age groups are more inclined to favour family planning. Some observers also find grounds for optimism in the fact that, just as mortality in developing countries has declined faster than it did in those that are now industrialized, fertility, once it began to fall, has declined very much faster than in the past. Speculation leads to the view that the halving of birth rates, which may have taken in the past some 50 years after the onset of fertility decline, may take only about 20 years as far as recent fertility declines are concerned. This suggests that the demographic transition in the developing countries may run its course in a much shorter period than it did in the developed countries. Even if this should prove to be true, others argue that growth rates are also much higher than in the past and that existing age structures will postpone a stabilization of population for a long time to come. Again, others question the predictability or likelihood of an imminent fertility decline. Although they acknowledge that current demographic trends in the developing countries are only a stage in the transition of these countries, its duration depends upon many interrelated factors which may take a long time to take effect.[30]

41. At one extreme, some fear that high rates of population growth will in themselves contribute to deterioration or stagnation in economic and social development and thereby prevent a fertility transition. The adjustment that has to be made to the rapid decline in death rates in the developing countries, it has been noted, is much greater and more pressing in many important respects than it was in the past in the now developed countries. In the first place, current population growth in the developing countries is much higher than it was at a comparable stage in the currently developed countries. In the second place, the economic levels and reserves developing countries are, on the whole, much lowe those of the developed countries in pre-modern In the third place, tolerance for economic depri and inequalities has been lowered with the spr modernism and of recent views on the importa equality of opportunity and of assuring a minim material benefit to all groups. [31] Rapid popu growth, it is sometimes asserted, may create a circle of poverty and population growth and m questionable to what extent modernization can pr without the completion of the demographic tran These considerations raise the question whether in economic and social development in the deve countries can be maintained in the face of their pective population trends. This question is consi below.

[28] United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *loc. cit.*, table 5 and para. 29. J. Pajestka, *loc. cit.*, para. 23.

[29] N. V. Sovani, "Population trends and agricultural development: case studies of Sri Lanka and India" (E/CONF.60/SYM.I/11), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

[30] G. A. Pavlov, "The interrelationships between development and population in the developing countries", *Population Debate*, vol. I, part four, paras. 12-17.

Economic and social consequences of demographic trends

42. With the emergence in recent decades of demographic trends in the developing countries need for a better understanding of the impact of d graphic factors on economic and social developmen become a matter of prime concern. Commens with the growing recognition of the problem, there been significant increases in information, research analysis. Nevertheless, the economic and social sequences of population growth are less cl understood than the ways in which the course of po tion growth is affected by economic and social ch One reason for this may be that the consequences ca always be ascertained in isolation from the causes another, that they must depend very heavily o economic and social circumstances in which they c However, the most important, undoubtedly, is tha role of population in social and economic growth ca be expected to be very well known as long as understanding of the process of development remai imperfect as it is. Yet, it is with respect to these sequences that the current deep apprehensions a population growth have been aroused and that the r causes of concern must be examined. The follo review is intended to present only selected highli including: (*a*) a comparison of population growth t with some of the major factors of economic and s development in recent decades, in order to asses major economic and social correlates of popul trends and to bring out some of the similarities divergencies; and (*b*) a more general and specul consideration of the implications of demographic t for the major developmental variables.

Recent trends in population and some major aspe of development

43. In reviewing the economic and social corre of population trends, it is important to recall the li

[31] S. Kuznets, *loc. cit.*

tions to which such comparisons are subject. There are considerable gaps in the existing information, and, even where statistics are available, the analysis of international trends encounters severe problems with regard to the reliability, comparability and conversion of data to uniform bases of the data Limitations of this kind exist for demographic data, but they apply particularly to most of the economic and social indicators With certain notable exceptions, relatively reliable population estimates are available for most countries However, this is not so in the case of most economic and social variables the short-comings of the indicators considered below, estimates of national income, agricultural and food production estimates and educational statistics are well known.

Growth of population and income

44 One immediate effect of the more rapid growth of population in the developing countries has been the relative increase of the world's population living in what have come to be regarded as low-income countries It has been estimated that, of the increase in world population from 2 5 thousand million to over 3 6 thousand million between 1950 and 1970, four fifths occurred in the developing countries As a result of this differential in growth rates, the proportion of the world population living in the less developed, predominantly low-income regions rose from about 66 5 per cent in 1950 to over 71 0 per cent in 1970, while the proportion for the most developed countries decreased from 33 5 to 29 0 per cent

45. The available estimates indicate that in the past decade, population as well as total product and income have increased rapidly. It is generally acknowledge that so far the post-war period has been one of rapid economic growth The total gross domestic product, at constant prices, of the market economies for which data are available increased between 1960 and 1970 at an average annual rate of 4 9 per cent, outpacing the growth of population—2 1 per cent per annum—by a large margin (table 1) [32] Evidence shows that during the 1950s the increase in product was only slightly less Although data for earlier periods are difficult to obtain, these growth rates were well above long-term trends in the past Economic growth in the centrally planned economies has if anything been even more rapid than in the market economies [33]

46 Despite the large differences in population growth between developed and developing countries, total product increased at similar rates in both, but because of differentials in population growth, *per capita* gains in the developing countries were much more modest The total gross domestic product of the developed market economies increased at the rate of 4 8 per cent per annum between 1960 and 1970, while the estimated rate for the developing countries was 5 1 per cent or even somewhat higher. These relatively small differences in growth of total product were associated with a considerable divergence in population growth· 1 1 per cent in the developed countries; and 2 5 per cent in the developing ones With these rates, *per capita* product in the developing countries expanded at a rate of 2 6 per cent per annum Such a rate—implying a doubling of *per capita* product in 27 years—was probably unprecedented in the history of these countries and cannot have been sustained for any length of time

[32] United Nations Secretariat, "Major economic and social correlates of population trends, 1950-1970", *loc cit*

[33] For some data on the Union of Soviet Socialist Republics, see G A Pavlov, *loc cit*, pp 8-9

TABLE 1 GROWTH RATES OF POPULATION AND GROSS DOMESTIC PRODUCT BY REGION, 1960-1970

(*Gross domestic product in United States dollars at constant prices of 1963*)

Region and country	Average annual rate of growth, 1960-1970 (percentage)		
	Population	Gross domestic product	Per capita gross domestic product
Market economies	*2 1*	*4 9*	*2 7*
Developed market economies	1 1	4 8	3 7
Less developed market economies	2 5	5 1	2 6
Africa	2 5	4 5	2 0
South Africa	2 2	5 6	3 4
North America	1 4	4 1	2 7
Caribbean and Latin America	2 8	5 4	2 6
Asia — Middle East	2 8	6 7	4 0
Israel	3 1	8 6	5 1
Asia — East and South-East	2 5	4 6	2.1
Japan	1 1	11 1	9 7
Europe	0 7	4 8	4 0
Oceania	2 9	6 2	3.3
Australia, New Zealand	1 9	5 0	2 9

SOURCE United Nations Secretariat, "Major economic and social correlates of demographic trends, 1950-1970", *Population Debate*, vol 1, part four

in the past. Moreover, this high growth was attained in the face of similarly unprecedented growth of population.[34] Nevertheless, in the developed countries, the growth of *per capita* product, 3.7 per cent, was well above that in the developing countries; and the gap in *per capita* income between the two groups of countries widened significantly. Whereas, in the richer countries, over 75 per cent of the growth in total product represented increases in *per capita* income in the poorer countries, only about half of the aggregate growth was left for improving the *per capita* supplies of goods and services. Although the purely statistical nature of such a comparison has been emphasized, it has been observed, nevertheless, that this widening of the relative gap between rich and poor countries is almost entirely due to the more rapid growth of population in the latter.[35]

47. Furthermore, estimates of the growth of *per capita* product and population in a number of developing countries during the past decades provide no evidence of any relationship between the two. In order to examine the possible interrelationships between population growth and the growth of *per capita* income in developing countries, data for 50 developing countries or areas for the period 1960-1970 were selected (table 2). The correlation between the average annual growth of population and the corresponding growth rate of *per capita* product was found to be positive (+0.1344) but not significant, a finding corroborated by various other studies.[36] The fact that the respective rates do not exhibit any relationship should not be interpreted to mean that there is no association at all between population and economic growth or growth of *per capita* income in other contexts or under specific conditions. It may very well be that, in comparison with other factors and determinants of economic growth, the effects of population growth are not so predominant as to manifest themselves clearly in different circumstances. This does not imply that population growth is not important; but that its relations to economic growth are part of a complex of interrelations and interactions, and that, under different configurations of factors and conditions, the demographic impact on economic factors may vary. It is likely that, under given conditions, lower population growth would induce a more rapid growth of *per capita* product, if not of total product. Moreover, the short-comings of income or product as an indicator of development or even of economic growth are universally recognized. Even if growth of *per capita* income were not slowed dow[n] higher population growth, the latter might create c[...] serious problems, including those related to the [pro]vision of sufficient employment opportunities, equitable distribution of income and the creatio[n] acceptable social conditions and opportunities.

[34] S. Kuznets estimates growth of *per capita* product in the developing countries during the 1950s and 1960s to be considerably lower than the figures cited above (1-1.5 per cent); *loc. cit.*, para. 32. See his "Problems in comparing recent growth rates for developed and less developed countries", *Economic Development and Cultural Change*, vol. 20, No. 2 (January 1972), pp. 185-209.

[35] H. W. Singer, "Income distribution and population growth", *Population Debate*, vol. I, part four, paras. 2-3.

[36] Alfred Sauvy, "Recherche d'une équilibre entre la population et le développement", *Papers*, vol. I, part four, paras. 38-42. See also K. H. Khalil, "The impact of development on population growth" (E/CONF.60/SYM.I/23), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

TABLE 2. GROWTH RATES OF POPULATION AND GROSS DOM[ESTIC] PRODUCT *per capita* FOR SELECTED DEVELOPING COUN[TRIES] AND AREAS, 1960-1970

Country or area [a]	Population growth rates	Gross dom[estic] product per capi[ta] growth ra[tes]
Iraq	3.65	2.58
Jordan	3.44	1.54
Syrian Arab Republic	3.32	3.08
Philippines	3.30	1.50
Thailand	3.15	4.42
Pakistan	3.10	0.82
Lebanon	3.04	2.03
Hong Kong	3.02	5.99
Malaysia	2.85	2.94
Turkey	2.82	2.60
Iran	2.77	5.67
Indonesia	2.59	1.22
Singapore	2.53	6.63
India	2.48	1.18
Sri Lanka	2.42	2.58
Burma	2.23	1.39
Afghanistan	2.07	0.00
Morocco	3.01	0.81
Kenya	2.95	2.53
Tunisia	2.95	2.02
Sudan	2.93	0.56
Zambia	2.88	3.11
Ghana	2.87	−0.26
Egypt	2.71	2.78
Uganda	2.50	1.52
Nigeria	2.49	0.35
United Republic of Tanzania	2.48	2.04
Sierra Leone	2.13	3.82
Zaire	2.09	1.12
Ethiopia	1.91	2.64
Costa Rica	3.77	2.65
Mexico	3.41	3.44
Honduras	3.32	1.80
Dominican Republic	3.29	0.30
Paraguay	3.29	1.31
Colombia	3.27	1.82
Ecuador	3.26	0.88
El Salvador	3.18	2.30
Panama	3.17	4.49
Peru	3.04	2.02
Nicaragua	2.97	4.04
Guatemala	2.91	2.44
Brazil	2.88	0.79
Guyana	2.77	0.98
Chile	2.41	1.92
Haiti	2.34	−1.24
Bolivia	2.31	2.91
Jamaica	2.03	2.81
Argentina	1.53	2.54
Uruguay	1.28	0.09

SOURCE: United Nations Secretariat, "Major economic [and] social correlates of demographic trends, 1950-1970", *Po[pu]lation Debate*, vol. I, part four.

[a] Countries or areas are arranged within regions in [de]scending order of population growth.

TABLE 3 TOTAL POPULATION, AGRICULTURAL POPULATION AND PERCENTAGE OF TOTAL IN AGRICULTURE, 1950 AND 1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

(Millions, except as indicated)

Region	Total population		Agricultural population		Percentage in agriculture	
	1950	1970	1950	1970	1950	1970
World total	*2,485 7*	*3,635 2*	*1,579 4*	*1,860 1*	*63 5*	*51 2*
More developed regions	831 1	1,051 2	291 9	198 9	35.1	18 9
Less developed regions	1,654 6	2,584 0	1,287 5	1,661 1	77 8	64 3
South Asia	*698 4*	*1,125 8*	*544 6*	*763 2*	*78 0*	*67 8*
East Asia [a]	574 1	826 4	482 4	539 9	84 0	65 3
Europe	392 0	462 1	127 9	89 0	32 6	19 3
Africa	217 3	344 5	171 3	239 3	78 8	69 5
USSR	180 1	242 6	100 5	77 3	55 8	31 9
Northern America	166 1	227 6	21 7	10 0	13 0	4 7
Latin America	162 4	283 2	87 1	117 9	53 6	41 6
Oceania	12 6	19 4	3 6	4 3	29 0	22 1
Japan	82 9	103 5	40 3	21 3	48 6	20 6

SOURCE Based on United Nations Secretariat, "Demographic trends in the world and its major regions, 1950 1970", *Population Debate*, vol I, part two

[a] Excluding Japan

Population trends, agriculture and food

48 Agriculture still plays a major, though decreasing, role in the socio-economic structure of most areas of the world About half of the world's population depends directly upon agriculture, but, as is to be expected, the degree of dependence in developed and developing countries is quite different In 1970, the agricultural population amounted to less than one fifth of the total population of the developed countries, but continued to represent close to two thirds of the population of the developing countries (table 3) The proportion of agricultural population in the developing regions ranged from 65 3 to 69 5 per cent in East Asia (excluding Japan), South Asia and Africa However, it was only 41 6 per cent for Latin America which in this respect occupies an intermediate position between the average developed region and the other developing regions. Likewise, considerable differences existed between developed and developing regions with regard to the share of agriculture in total product. In the most advanced market economies, agriculture generated in recent years less than 10 per cent of total gross domestic product, while the corresponding share in most developing regions was well over 20 per cent and in a number of cases, particularly in South-East and East Asia and Africa, it may have been as high as 30 or even close to 40 per cent [37]

49 The increased volume of migration to urban areas in recent decades and the corresponding shift away from agriculture has brought substantial declines in the relative importance of the agricultural population For the world as a whole, the share of the population dependent upon agriculture is estimated to have decreased from 63 5 per cent in 1950 to 51 2 per cent in 1970 In the more developed regions, the proportion dropped from 35 1 to 18 9 per cent over this period, while in the developing regions, it is estimated to have decreased from 77 8 to 64 3 per cent (see table 3). These trends reflect a moderate growth of agricultural population in the developing countries and even in some instances a decline in absolute number. Reductions in the absolute size of the population dependent upon agriculture were typical for the more developed countries, and in fact between 1950 and 1970, their agricultural population fell by about one third In the developing countries, the growth of agricultural population was still substantial, 29 per cent; but even so, only about half as great as the growth in total population, which was 56 per cent As one consequence of these trends, agricultural density in the developed countries, which was already only moderate, declined further, and even in the developing countries as a whole, the number of persons dependent upon agriculture per unit of agricultural land did not change much, since the moderate growth of agricultural population was associated with an expansion of the area used for agriculture.

50 Even though the moderate growth in agricultural population in the developing countries and the relatively small increases in agricultural density suggest that the pressure on agricultural resources did not increase significantly in this period, the agricultural gross domestic product sustained a low rate of growth, far below that of over-all gross domestic product With agricultural population in the less developed regions (excluding the centrally planned Asian economies) expanding at a rate of about 1.7 per cent per annum during the 1960s, and agricultural product at 2 8 per cent, the product per person in agriculture increased at an average of about 1.1 per cent per annum In contrast, in the developed areas, a declining agricultural population associated with a growth of total agricultural domestic product of about

[37] United Nations Secretariat, "Major economic and social correlates of demographic trends, 1950 1970", *loc cit*

the same order of magnitude as in the developing ones signified an increase of the *per capita* product of the order of 4.5 per cent.[38]

51. Food, which is closely related to agriculture, is man's most essential economic necessity; the development and even the survival of any society depends to a great extent upon its capacity to provide its members with at least the minimum requirements for food. Although in the past two decades, the growth of the world's food production outpaced that of population by a considerable margin, a significant excess of food production over population was found only in the more developed countries, while the margin in the developing regions, where population increased much more rapidly, was much smaller. Between the early 1950s and 1970, world food production is estimated to have increased at an average annual rate of about 3.0 per cent and *per capita* food production at about 1.1 per cent a year. Even though the growth rate of food production was similar in both developed and developing regions, because of the differential in population growth rates between the regions, trends in *per capita* food production were quite different. The average annual gain i *per capita* food production was thus 1.8 per cent in th developed countries, but only about 0.8 per cent in th developing regions.

[38] *Ibid.*

52. Moreover, within the post-war period, condition have deteriorated to a point at which the growth c population has tended to accelerate and that of foo production has slowed down, resulting in a significan lowering of the margin of food production over popula tion growth. The major impact of this shift was fel in the developing countries. The growth of food pro duction in the world, developed and developing region was about 3.2 per cent between the early 1950s an 1960s, but decreased to rates of the order of 2.8 pe cent in the 1960s. Over the same period, world popula tion growth accelerated from 1.8 to 2.0 per cent, thu reducing the margin of growth of food production ove population from about 1.4 per cent a year to 0.8 pe cent. Trends diverged considerably between th developed and the developing regions, and the exces of food production over population growth narrowe particularly in the latter and virtually disappeared i Africa, although it increased somewhat in Latin America:

Region	Growth rates (percentage per annum)					
	Population		Total food production		Per capita food production	
	1952-1960	1960-1970	1952-1960	1960-1970	1952-1960	1960-1970
World . . .	1.8	2.0	3.2	2.8	1.4	0.8
Developed regions	1.3	1.1	3.2	2.6	1.9	1.5
Developing regions						
Africa . .	2.2	2.5	2.8	2.6	0.6	0.1
Asia	2.0	2.2	3.4	2.7	1.4	0.5
Latin America	2.8	2.9	3.2	3.5	0.4	0.6

SOURCE: Based on Food and Agriculture Organization of the United Nations, "Population, food supply and agricultural development", *Population Debate*, vol. I, part four, table 1.

53. Although food production at the global and regional level outpaced population growth, this average conceals significant variations in growth rates between individual countries. In 27 of the 106 countries for which data for the period from 1952 to 1971 are available, food production increased less than population. The failure of food production to keep up with population growth was especially pronounced in the case of the developing countries. Out of the total of 106 countries, 72 were classified as developing; but in 24 of these, or one third, food production lagged behind the growth of population. In only 25 of the developing countries did food production increase faster than effective demand. In the more recent period, it has been noted, the situation was even less favourable.[39]

[39] Food and Agriculture Organization of the United Nations, "Population, food supply and agricultural development", *Population Debate*, vol. I, part four, paras. 8-11 and annex.

54. Considerable disparities exist between the more developed and less developed regions with respect to nutrition and the incidence of nutritional inadequacies. Although assessing nutritional status and its shortcomings presents a number of problems, the available estimates confirm the existence of considerable quantitative as well as qualitative differences between the regions.

55. With regard to the availability of calories, it has been estimated that supplies in the developed regions exceed those in the various developing regions by margins ranging from about 23 per cent in Latin America to 40 per cent in Africa and as much as 55 per cent in Asia (table 4). While supplies in the developed regions are on the average some 20 per cent in excess of requirements, in the developing countries they fall about 4 per cent short of needs. Calorie deficiencies are most pronounced in Asia, representing 11 per cent of requirements, followed by Africa, where the shortage amounts to about 4 per cent. Deficits in

TABLE 4 CURRENT LEVELS OF FOOD CONSUMPTION *per capita* IN RELATION TO NUTRITIONAL REQUIREMENTS, BY REGION

Region	Total supply		Total requirements	
	Calories per capita	Grams of protein per capita per day	Calories per capita	Grams of protein per capita per day
Asia	2,050	54 5	2,300	37 8
Africa	2,262	61 0	2,350	41 5
Latin America	2,579	65.2	2,380	37 7
North America, Europe and Oceania	3,170	91 7	2,590	39 8

SOURCE Food and Agriculture Organization of the United Nations, "Population, food supply and agricultural development", *Population Debate*, vol I, part four

calories appear to exist in all subregions of Asia, with the exception of Japan and Israel, and of Africa, except for Eastern Africa and South Africa [40] In Latin America, supplies exceeded requirements by about 8 per cent. Calorie supplies are estimated to be less than requirements in 44 out of the 72 developing countries for which data are available, and in 16 of those the deficit exceeds 10 per cent Estimates of protein requirements and supplies suggest the existence of a surplus in all regions and countries, although in this case also, the position of the more developed countries is considerably more favourable Moreover, account should be taken of the unequal distribution of supplies within countries [41] Data on the shares of different foods in total calorie and protein intake reveal that the developing regions, with the exception of Latin America, are relying heavily on cereals to supply their populations with their energy intake and proteins (table 5). In Asia, as much as two thirds of the calorie intake comes from cereals; and in Africa, the proportion is more than half, although in some parts of Central and Western Africa, starchy roots are the main source of calories [42] In contrast, the main sources of nutritional requirements in the developed regions are meat and dairy products It should be recalled that assessing nutritional adequacy or inadequacy on the basis of national averages underestimates the extent of the food problem Even in developed countries, food is never distributed according to nutritional requirements. In fact, food is invariably unevenly distributed, owing to inequalities in income, differences between urban and rural areas and between different regions of countries, and factors such as climatic and seasonal variations. The assessment of nutritional deficiencies made in 1963 in the Third World Food Survey indicated that at least 20 per cent of the population in less developed regions was undernourished More recent data indicate that this percentage may have declined slightly, but that the absolute numbers affected will be at least of the same order of from 300 million to 500 million [43]

[40] *Ibid*, paras 11-14
[41] *Ibid*, paras 20-23
[42] *Ibid*

Population trends and school enrolment

56 The importance of the interrelations between population and education as both a means to and a goal of development has been frequently stressed Not only is education affected by the dynamics of population, but, conversely, the dynamics of population are affected by educational development What follows is a consideration of the former of these relations, on the basis of a brief statistical account of the trends in educational development, particularly school enrolment

57 Between 1950 and 1968, total school enrolment in the world's regions, excluding the Asian centrally planned economies, increased more rapidly than ever

[43] *Ibid*, para 23.

TABLE 5 CONTRIBUTION OF DIFFERENT FOODS TO THE TOTAL INTAKE OF CALORIES AND PROTEIN

(*Percentage*)

Region	Cereals		Starchy roots		Sugar		Pulses and nuts		Fruit and vegetables		Meat, eggs, fish, milk		Fats and oils	
	Calories	Protein	Calories	Protein	Calories	Protein	Calories	Protein	Calories	Protein	Calories	Protein	Calories	Protein
Asia	67	59	7	3	6	—	6	17	3	3	7	18	4	—
Africa	53	55	19	9	5	—	7	14	3	3	7	19	6	—
Latin America	39	39	11	5	17	—	7	6	3	3	16	37	7	—
Europe	38	39	7	6	12	—	2	3	4	5	23	47	14	—
North America	20	16	3	2	16	—	3	4	6	5	35	73	17	—
Oceania	25	24	3	3	17	—	2	2	5	4	37	67	11	—

SOURCE Data of the Food and Agriculture Organization of the United Nations

before. The number of pupils and students enrolled grew from somewhat over 220 million in 1950 to 460 million in 1968. The rise was impressive not only in absolute terms but in relation to population; the average rate of growth of enrolment, 4.1 per cent, was more than twice as fast as that of population, 1.9 per cent. Moreover, progress was particularly rapid in the developing regions, where enrolment expanded at an average of 5.7 per cent per annum, outpacing population growth, estimated at 2.3 per cent, by a considerable margin. The respective rates for the more developed countries, 2.6 and 1.2 per cent, were much lower as was the margin between them. Although within the period considered the rate of growth of total school population accelerated in percentage terms (from 3.4 per cent annually in the 1950s to 4.5 per cent between 1960 and 1968) and in comparison with over-all population growth (which rose from 1.8 to 2.0 per cent annually) this was due mainly to a sharp increase in the Soviet Union, and the momentum did not carry over to the developing regions. In the developing regions total enrolment increased at virtually the same rates in the two subperiods (5.7 and 5.8 per cent, respectively), but the average annual rate of population growth increased from 2.1 to 2.5 per cent. There were considerable differences between the developing regions and the virtual stabilization of rates of growth of enrolment was largely a reflection of a decline in Africa (from 8.3 per cent growth in the 1950s to 6.2 per cent between 1960 and 1968). In the other two developing regions, enrolment growth accelerated; but the increase was matched by increasing population growth in the case of Latin America, and remained behind the acceleration of population growth in Asia (table 6).

TABLE 6. AVERAGE ANNUAL RATES OF GROWTH OF TOTAL POPULATION AND TOTAL SCHOOL ENROLMENT IN MAJOR REGIONS, 1950-1960 AND 1960-1968

Region	*Average annual rate of increase (percentage)*			
	1950-1960		*1960-1968*	
	Population	*Enrolment*	*Population*	*Enrolment*
Total	*1.8*	*3.4*	*2.0*	*4.5*
More developed regions	*1.3*	*2.3*	*1.1*	*3.0*
Northern America	1.8	3.9	1.4	3.0
Europe	0.8	2.2	0.9	2.1
Oceania	2.3	4.9	2.1	3.7
USSR	1.7	0.5	1.3	4.4
Less developed regions [a]	*2.1*	*5.7*	*2.5*	*5.8*
Africa	2.2	8.3	2.4	6.2
Asia [a]	1.9	5.2	2.5	5.6
Latin America	2.8	6.1	2.9	6.2

SOURCE: United Nations Secretariat, "Major economic and social correlates of demographic trends, 1950-1970", *Population Debate*, vol. I, part four.

[a] Not including China, People's Republic of Korea and Democratic Republic of Viet-Nam.

58. Between 1950 and 1970, the number of children between 5 and 14 years of age—roughly the period identified with primary education—is estimated to have increased by 66 per cent in the developing countries, as compared with 35 per cent in the developed regions. The high growth rates of the school-age population in the developing regions constituted an extra burden, since the population in these ages represented a high proportion, 24-25 per cent, of the total population. In the developed regions, the corresponding proportions were only of the order of 17-18 per cent. Moreover, in the developed regions, primary education can be considered virtually universal; while the developing countries, despite the rapid expansion in enrolment at this level (5.5 per cent and more than double the growth of school-age population, 2.6 per cent, in 1950-1968), still remain far behind the developed regions. For instance, in Africa, where the rate of increase of primary school enrolment was most rapid, the enrolment ratio at the primary level rose from 34 per cent in 1960-1961 to only 40 per cent by 1967-1968. In Asia, there was a slight increase from 50 to 55 per cent; and in Latin America, the increase was substantial, from 60 to 75 per cent. Apart from the fact that progress in enrolment ratios in the developing regions, Africa in particular, has been relatively slow, there is another important reason for concern. During the period considered, the absolute number of children not enrolled in schools has increased substantially. In fact, it has been estimated that during the 1960s this number increased by 165 million, exceeding the growth in enrolment during this period (135 million) by 30 million.[44]

59. The rapid expansion of total school enrolment during the past two decades has been accompanied by

[44] United Nations Educational, Scientific and Cultural Organization, "Population and education", *Population Debate*, vol. I, part four, paras. 14-15.

substantial differences in the rate of increase of enrolment at different levels of education, some of which reflect diverse patterns in the more developed and the developing regions. On the whole, enrolment has increased faster the higher the educational level, although Africa and Latin America, where enrolment at the second level expanded faster than at the third level, are exceptions A comparison between the developed and the developing regions reveals, moreover, that enrolment at the different levels in the developing regions as a group and in each of them expanded more rapidly than in the more developed regions The single exception is found at the secondary level in Asia. However, when the effect of population growth is taken into account, much of the developing countries' relative advantage no longer exists; a significant difference between the two groups of regions in the excess of enrolment growth over population growth is found only with respect to primary education in developed countries. The growth of enrolment at this level barely exceeded population growth in the latter, while there was a substantial surplus of the growth of primary enrolment over population growth in the developing countries. However, after making allowance for the level of population growth, enrolment growth at the second and third level in the developing regions was on the average similar to or only slightly higher than the developed regions, thus suggesting a widening or at least not a significant decrease in the relative gap between developed and developing countries (table 7)

TABLE 7 GROWTH OF POPULATION AND ENROLMENT BY LEVEL OF EDUCATION 1950-1968, BY REGION

Region	Average annual rate of growth (percentage)				Excess of enrolment over population (percentage)		
		Enrolment					
	Population	First level	Second level	Third level	First level	Second level	Third level
Total	*1 9*	*3 5*	*5 8*	*7 5*	*1 6*	*3 9*	*5 6*
More developed regions	*1.2*	*1.3*	*5.3*	*6 9*	*0 1*	*4 1*	*5 7*
Northern America	1 6	1 9	6 2	6 9	0.3	4 6	5 3
Europe	0 8	1 1	4 3	6 4	0 3	3 5	5 6
Oceania	2 2	3.3	6 7	7 8	1 1	4.5	5 6
USSR	1 5	1 3	6 5	7 3	−0 2	5 0	5.8
Less developed regions [a]	*2.3*	*5.5*	*6.5*	*9 1*	*3.2*	*4 2*	*6 8*
Africa	2 3	7 1	10 7	9 8	4 8	8 4	7 5
Asia [a]	2 2	5 2	5 6	9 2	3 0	3 4	7 0
Latin America	2 8	5 6	9 6	8 7	2 8	6 8	5.9

SOURCE United Nations Secretariat, "Major economic and social correlates of demographic trends, 1950-1970", *Population Debate*, vol. I, part four

[a] Not including China, People's Republic of Korea and Democratic Republic of Viet-Nam

60 Although over the period considered enrolment ratios for the different levels of education increased for the world as a whole, patterns among individual regions varied greatly, suggesting, within the group of developing countries especially, the importance of the initial levels of enrolment as a factor in recent trends This would appear to imply that although the high growth rates of total enrolment in the developing countries are reduced to much lower levels when population growth is taken into account by calculating enrolment ratios, population growth would seem to be of relatively secondary importance in enrolment ratio changes compared with the influence of the initial levels

Some tentative findings

61. A brief review, such as the preceding, of some of the major economic and social correlates of population trends does not afford a very sound basis for generalization Nevertheless, it suggests certain tentative conclusions which, although subject to many limitations, raise a number of fundamental questions·

(*a*) Rapid population growth in the developing countries apparently has not prevented socio-economic progress. The growth of total product and *per capita* product, as well as of educational enrolment, has outpaced population growth by a considerable margin But this is not true in all instances: the growth of food production has barely kept up with population growth in the developing countries, and in recent years the narrow margin of food production over population growth has virtually disappeared. There are also indications that in absolute terms progress in some areas has been limited The available estimates convey, for instance, that the number of undernourished persons has not significantly declined, and the number of children not enrolled in school has in fact substantially increased,

(*b*) Despite considerable progress in absolute terms, the relative position of the developing countries with regard to the developed ones has, in general, not improved. Although, for instance, total product in the developing and developed regions increased at similar

rates, since population growth was much more rapid in the former the gains in *per capita* income were considerably smaller than in the more developed countries. The same would appear to be true with respect to overall educational enrolment and food. The indications are that the developing countries have been able to reduce the relative gap separating them from the developed countries only in those fields where the latter had reached or come close to the attainable limits. This was the case, for instance, in primary education (with enrolment near to 100 per cent in the developed countries) and probably in expectation of life (which in the developed countries is close to the present upper limit);

(*c*) There are large differences within the group of developing countries, but evidence as to how far different population trends within this group of countries are related to different rates of economic and social progress is scarce. Analysis by means of a simple correlation between the growth of population and *per capita* product in 50 developing countries did not reveal any systematic relation. Growth of enrolment and enrolment ratios for different levels of education indicate that initial levels were perhaps more important than population growth in determining differences between countries in this respect;

(*d*) Despite the inconclusiveness of some of these findings, rapid population growth must be considered to be a burden whenever it does not give rise at least to a proportionate increase of resources. It is doubtful whether this happens in most cases. In this connexion, the various limitations of superficial comparisons such as the preceding ones must be borne in mind. First, the post-war period was a time not only of exceptional growth of population, but of rapid economic and social progress. However, the period is too short for any generalizations; and there is no assurance that the latter trends will continue, whereas population growth has its own inertia which makes large future increases in numbers probable. Secondly, averages for all the developing countries or for those within one region do not reveal those cases where progress has been lagging. Economic and social development in many individual countries was above average; but, inevitably, in others it was slow, and in some cases there was even stagnation;

(*e*) In general, it is important to recall in this respect that there are large economic, social, institutional and political differences between countries, and that among these population may not be a predominant factor. Nevertheless, the findings suggest the need for a careful re-evaluation of the prevailing views on the impact of population trends on economic and social development.

The impact of population growth on economic and social development

The developed countries

62. For obvious reasons, most of the concern about the economic and social implications of population trends is inspired by conditions in the developing countries. Recently, however, population has come to be viewed by many as a serious problem in developed countries as well, although the rates of growth in such countries have been moderate and declining. It is important to recall that as recently as the 1930s, it was the stagnation of population growth that was viewed with alarm in precisely those countries. Among the arguments then advanced in favour of a population increase, one of the most important was the greater mobility and adaptability of a growing population and labour force. It was thought that population growth would ameliorate the problems raised by structural change and declining industry, and also it was an important stimulus both to investment and consumption and thereby to full employment. These arguments lost their force in the post-war period, when the problem was no longer one of deficient demand, and when major structural change was caused by technological progress and shifts in comparative advantage occurring so rapidly that the rate of population growth did not make much difference.

63. The case now made against population growth in developed countries is entirely different. Shortages of non-renewable resources figure particularly prominently in these arguments. Developed countries account for the bulk of the global consumption of many mineral resources, including fossil fuels. These problems fall outside the scope of this report as they are exhaustively surveyed in other documents, [45] but a few points must be made. In the first place, population growth has actually contributed relatively little to the rapid increase in the consumption of energy and mineral resources in developed countries in recent years. Population has been growing at about 1 per cent per annum, whereas energy consumption *per capita* for instance has been growing at some 5-7 per cent. Obviously, it is economic and technological growth that accounts for the explosive trends in resource consumption, and the situation would not be affected by the cessation of population growth or even by a modest decline.

64. Secondly, the known available reserves of virtually all mineral resources have so far continued to increase in spite of the steep rise in consumption, and their relative cost has shown a falling rather than a rising trend. When resources become scarce and rise in price, the exploitation of lower grade minerals becomes possible and reserves increase by very large factors. In addition, substitutions and economies take place as technological change adapts to new cost-structures. Without minimizing the importance of the long-run supply problems, one must therefore point out that these problems are likely to be misunderstood if current trends for the consumption of individual resources are set against the figure for estimated

[45] See, in particular, "Population, resources and environment; report of the Secretary-General", *Population Debate*, vol. I, part one.

reserves, leading to the apparent conclusion that exhaustion will occur in a few decades

65 The case is somewhat similar with regard to the urgent problems of pollution and environmental deterioration in developed countries. Although these are often linked to population growth, it can hardly be claimed that either the size or growth of population as such has been a major factor in the rapid deterioration of the environment in industrial countries Very sparsely populated industrial countries have serious environmental problems too, in part because populations in all industrial countries tend to cluster in very similar agglomerations, but chiefly because technological and industrial growth in the post-war period has been heavily polluting The remedy for these serious problems is to pursue environmental policies that limit effluents, not to make a marginal change in the population

66. A whole list of other acute problems in contemporary industrial societies are also at times blamed on over-population or population growth It is understandable that the crowding and congestion of modern cities should sometimes be seen as a consequence of "over-population", however this may be defined. In some senses, it may well be true. What is obviously not true is that these phenomena can be ascribed to the growth of national populations. Urban growth in these societies is almost everywhere the result of a migration towards the great population centres which results in a depopulation of the countryside and small communities To the extent that the resulting patterns of settlement are found to be undesirable or inefficient, regional development and urbanization must be tackled so as to modify the distribution of the population. But whether over-all population is growing slightly or not is fairly irrelevant to this process The *conclusion would seem to be that the economic case* against population growth of current magnitude in developed countries is rather weak. The ills ascribed to it derive either from rapid economic growth or from a rapid migration of population

67. While the preceding view may be held by a majority, there are many serious students of the world situation who find it totally inadequate and who insist that it is of vital importance to achieve zero population growth as fast possible and to stabilize or perhaps even to lower the levels of production and income The basic reason for such uncompromising positions is that global stocks of non-renewable resources are assumed to be in danger of exhaustion within a dangerously short period of time. Although population is growing relatively slowly in developed countries, resource use *per capita* is very much higher there, and a reduction of growth in those *countries means a proportionately greater relief.* Without in any sense diminishing the seriousness of the population problem in developing countries, this view of the global limits to growth, therefore, leads to the conclusion that growth must be checked everywhere. It is also often argued that the industrialized countries' large imports of resources from developing countries deprive the latter of resources needed by themselves, either now or in the future

68 As it happens, the trends of fertility in developed countries already point downward. Many of those countries realize that their populations may be, in a not too distant future, facing a decline. The political response to such a situation is difficult to predict, but the experience of the 1930s suggests that there might then be a call for more pro-natalist policies. From a strictly economic point of view, the difficulty is that there is no clear consensus on what is really implied by the social interest and on whether it would demand far-reaching attempts to influence or control private decisions about having children Many see inconveniences in a rapidly growing population, while others fear the consequences of a declining population; but there is no firm basis for the formulation of a deliberate policy on what rate of population growth would be desirable from a social point of view On the other hand, developed countries all pursue welfare policies which have a bearing on the population problem Family allowances may be assumed to have some pro-natalist impact even when this it not their ostensible purpose Social security for the aged, on the other hand, will reduce the incentive of parents to have many children in order to ensure their own support in old age Policies in regard to family planning and abortion are also credited with demographic significance, although it is by no means clear how important they have been The fertility transition in developed countries occurred in the face of firm official opposition, and the liberalization of official attitudes towards family planning has almost everywhere been an adaptation to prevailing attitudes and practices rather than a leading influence These experiences should be borne in mind as one proceeds to examine the *situation in developing countries*

The developing countries

69. The many ways in which population affects economic growth and social progress derive from man's double role as the basic agent and final goal of economic and social change It is fundamentally through its dual role as producer and consumer that population influences other economic and social factors; and the balance of the effects on production and consumption, interpreted in their broadest sense, determine the impact of demographic factors on levels and conditions of living The net effect, however, is the outcome of an almost infinitely complex network of relations between population size, growth, composition and distribution, on the one hand, and the numerous relevant economic *and social variables, on the other. The following sections* attempt a survey of some of the most crucial aspects of this problem for the developing countries, considering first the demographic impact on economic growth and development, followed by the relations between population and the supply and provision of basic goods and services and individual well-being

Population and agricultural resources and development

70. There is no doubt that traditional thought on population was greatly concerned with the size of population in relation to what was termed "resources". A good deal of the confusion about the relation between population and economy derives from the vagueness of the concept of productive resources. To the untutored mind, the notion suggests the bounties of nature, such as the land, water, minerals and perhaps even climate, available within certain bounds to a population having some effective claim on them. Without disregarding the role of these aspects, economists have come to put less emphasis on nature as such and more on the human creation of resources by two principal means. Technology in a broad sense makes it possible to take advantage of the natural environment. Mineral deposits, for instance, can hardly be termed natural resources unless the scientific and technical knowledge exists to locate them and put them to use, and the same is true of soils which cannot be cultivated until a suitable crop is found. In this way, technological improvement actually creates economic resources. Another method of creating resources is through the construction of tools, machinery, buildings, roads and so forth, in short, physical capital, and the development of human resources themselves. Technology obviously dictates the design of capital equipment, and there is a strong case for saying that it is the prime mover of economic change. On the other hand, the development of new technology requires research and experiments and may be seen as an aspect of capital formation. The shift from a conception of resources as a matter of natural endowment to one of technology and human capital formation obviously affects the perception of the relation between population and resources. [46]

71. The classical view, of course, emphasized the critical importance of land resources and their relation to population and argued that continued population growth would lead to an increasing pressure on land and ultimately to a state of economic stagnation characterized by a stationary population existing at the subsistence level. The importance traditionally ascribed to the population-land ratio declined greatly as the additional dimensions of the problem, technology and capital, became evident. A look at the population densities of countries or regions is also enough to show that over-all density cannot account for the differences in levels of income or development. There are extremely poor countries as well as rich ones with very high densities, and the same is true of very low densities. Nevertheless, the interest of density figures can obviously not be entirely dismissed. The inference seems warranted that in those developing countries where density and the population-land ratio are very high and land scarcity is associated with low levels of productivity, substantial population growth cannot but have an adverse effect on agricultural and over-all economic development. Conversely, it has been argued that in sparsely settled areas with vast agricultural and other resources, the potential induced by population growth for economies of scale, the progressive integration of different agricultural areas in the market economy and lower costs of transportation might be so important as to outweigh the possible disadvantages resulting from the increase in numbers. [47] It is often held that many of the sparsely settled African and Latin American countries will benefit from becoming more populous. [48] However, such questions can be answered only in the specific circumstances of each country and with due regard to initial conditions, the desirable rate of population growth and what a greater population would imply for the distribution of population. [49]

72. When the concept of over-population is invoked, it is usually with specific reference to agrarian conditions. There are spectacular differences between the densities of agricultural population in relation to agricultural land in different regions of the world (see table 8) and even more so in individual countries. In all the major developing regions, in 1970, the number of persons dependent upon agriculture per square kilometre of agricultural land was higher than in any of the more developed regions. Agricultural density was highest in East Asia, where it was 90 times larger than in Northern America, which had the lowest agricultural density. These figures reflect many things at once, but most of all two great differences: the difference between

TABLE 8. AGRICULTURAL DENSITY, 1950 AND 1970, IN THE WORLD AND EIGHT MAJOR AREAS

Area	*Agricultural population per square kilometre of agricultural land* 1950	1970
World total	*129*	*132*
More developed regions	46	31
Less developed regions	221	226
South Asia	227	235
East Asia	493	453
Europe	87	60
Africa	92	117
USSR	45	33
Northern America	10	5
Latin America	104	96
Oceania	19[a]	18[a]

SOURCE: Report of the Secretary-General, "Recent population trends and future prospects"; *Population Debate*, vol. I, part one, table 18.

[a] Not including cultivated grasslands in Australia.

[46] United Nations Secretariat, "Population and Development", *Population Debate*, vol. I, part two.

[47] *Ibid.*, paras. 9-14; A. Sauvy, *loc. cit.*

[48] See, for example, A. A. Ayida and G. P. O. Chikelu, "Demographic aspects of development planning", *Population Debate*, vol. I, part four; para. 37; K. H. Khalil, *op. cit.*, pp. 12-14.

[49] A. Sauvy, *loc. cit.*, paras. 61-68.

agricultural technologies with high and low productivity per worker; and the difference between extensive and intensive technologies. They raise troubling questions about the possibility of offsetting such great differences in density.

73 Although it is impossible to claim from the statistical evidence as such that some countries are over-populated, it is tempting to argue that it might be possible if account were taken of the state of technology and other circumstances One such approach, which is founded in economic theory, defines over-population as a state of affairs in which non-labour resources, such as land and capital, are so scarce in relation to the labour force that, with the available technology, the marginal product of labour is below subsistence requirement, or even zero. If the marginal product of labour in agriculture was zero it would mean that the rural population could be reduced without any reduction of total output Some economists have claimed that available evidence shows this to be untrue, but it remains a moot question. At any rate, there is no reason to reject this conception of over-population on theoretical grounds, although it should be recalled that it is not a matter of geographical density Institutional factors often limit the supply of arable land to far below the potential, and a shortage of capital may be more instrumental than land scarcity in holding down the marginal product of labour. Also, in many "over-populated" countries, migration to urban areas has alleviated the pressure on the land, but, in the absence of sufficiently rapid industrialization, has added to the burden of unemployment and of providing food supplies and services in the cities.

74 The prospects for agricultural development are in general not clear. There are fundamentally two methods of increasing agricultural production One is to expand the agricultural land in use through such measures as bringing forests and wasteland into cultivation, transforming fallow land and natural grazing areas into cultivated land and shortening the fallow period and increasing multiple cropping The other method is to increase industrial and scientific inputs such as improved seeds, chemical fertilizers, insecticides, irrigation, mechanized equipment and so forth. Agricultural development strategies as a rule rely on a combination of these methods [50]

75 It is still possible to bring much forest and wasteland, as well as fallow and grazing land, into cultivation, at least in theory. While in Asia, excluding China, 24 per cent of the land is under cultivation, in other areas, only 6-7 per cent is so used Nevertheless, the technical and organizational difficulties and the cost of extending the area of land under cultivation cannot be minimized Moreover, there are considerable regional and national differences, and population density in Asia is much higher than in Africa or Latin America. The main hope for increasing agricultural production lies in technical progress and raising yields per unit of land So far, results have, on the whole, fallen short of expectations. It has been observed, for instance, that in Asia and Latin America, in particular, crop yields per hectare between the early 1960s and the beginning of *the 1970s increased at considerably slower rates than* the suggested growth targets. It was only because these shortfalls in productivity increases were in part offset by a greater expansion of the area sown than had been foreseen that agricultural production did not increase at an even slower pace [51] In general, the economic, social and agrarian structures have not favoured substantial improvements in the level of living and nutritional levels of the rural population In addition, new technologies are not often adapted to the prevailing conditions of labour supply Most technical solutions, in spite of the need for labour-intensive methods of production tend, on the contrary, to be in the direction of lower labour-input requirements This should be carefully taken into account in assessing the significance of current population trends [52]

76 In a balanced approach to agricultural development in relation to population growth, the prospects of the international market for the agricultural produce of the developing countries should also be considered The highly protective policies of the developed countries are frequently an obstacle to the encouragement of agricultural output in the developing countries, particularly through their effect on export prices and consequently on balance of payments prospects The combination of inelastic supply of food and restricted market outlook means that many developing countries remain obliged to devote large shares of their normal export proceeds to food imports. Such countries, in extreme conditions, as in the case of the current famine conditions in parts of Africa and India, also have to resort to international food aid programmes This is not a lasting solution to the pressing problems posed by the population growth and nutritional needs of the poorer countries In the long run, international technical and financial resources will be required in far larger volume to help the developing countries to achieve a large measure of self-sufficiency in basic foods, which will also be facilitated by a lower rate of population growth. [53]

77. Closely allied to these problems is the fear that population will outrun food supplies This concern is reinforced by the fact that hunger and malnutrition do not merely loom in the future, but are currently tragic realities in a number of developing countries. A considerable part of the world's population lives in areas where the food supply is precarious. These are often also the areas of rapid population growth It is well known that some experts believe that the population of developing countries is increasing at such a rate

[50] Ester Boserup, "Population and agricultural productivity", *Population Debate*, vol I, part four, para 1

[51] *Ibid*, paras 8-10

[52] "Report of the Symposium on Population and Development", *loc. cit*

[53] *Ibid*

that food production cannot even keep up, let alone allow for any improvement in the diet of poor countries. They claim to foresee within a few decades world-wide food shortages of increasing severity brought about by population growth.

78. Although such expectations are not generally shared, the prospects for food production are very difficult to predict. In the first place, food output is not only a matter of supply limitations but in many respects one of effective demand. Rural poverty, which is due to low agricultural productivity, produces low incomes and low food consumption standards. The production of food, for all its crucial importance to human life, is subject to the same general principles as any other economic activity. Secondly, there is an extensive international trade in food and it would not be reasonable to assume that all countries should be self-sufficient in it. However, because food demand has exceeded supplies, many developing countries have been forced to increase, as noted, their dependence on food imports or to reduce their food exports. [54] Moreover, food trade requires adequate channels of distribution, the absence of which has played a part in many regional food shortages in historical times. Local food shortages due to droughts or other harvest failures have always been frequent, but their incidence has been mitigated rather than enhanced in recent decades.

79. When all these things have been said, there still remain aspects of the situation that give cause for grave concern. Although some expert opinions claim that the world's potential agricultural output would already suffice to provide an adequate diet for some 40 thousand million to 75 thousand million people or even more, such estimates are based on the assumption of new technologies for agriculture in the humid tropics and a uniformly high degree of exploitation of potentially arable land. All this points to the need to conduct intensive programmes to increase food supply in the developing countries and to organize adequate world food programmes through international co-operation.

80. In general, the impact of rapid population growth on food supplies as well as on agricultural production, employment and migration, derives from a complex network of interrelations, which varies according to different national and local conditions. In some countries, the prospects for food supply may appear better than in others; but in the developing countries as a whole, experience so far indicates that, even with the introduction of new agricultural inputs and techniques in some areas, it has not been possible to increase production levels by as much as 3 per cent a year. Although the rate that has been achieved probably exceeds that of population growth, the margin is declining and is too small to raise the average levels of nutrition significantly and permanently. In many countries, where the prospects for increased agricultural output are limited, the advantage of a lower population growth rate for achieving sorely needed gains in nutrition is evident.

Savings and investment

81. The types of population problem in developing countries discussed so far have been concerned mainly with the size of the population. An entirely different set of approaches focuses on population growth. Economists and demographers have in recent years been far more attracted to this topic. First, the problems of less developed countries seem in many respects very similar, regardless of whether they are densely populated or not, and all of them share the characteristics of high fertility and growth. Secondly, approaches of this kind make it possible to focus more specifically on man-made resources, i.e., capital, which have played a dominant role in simple models of economic growth.

82. The most influential family of population models has been the so-called "Coale-Hoover type". [55] They are designed for developing countries in which it may be assumed that population growth is due to a fairly sudden fall in mortality, and seek to explore the macro-economic implications of whether fertility is reduced or not in response to this. It is assumed that large families save less out of household income than small ones, and at the same time that a young and growing population requires schools, hospitals and other welfare expenditure which cuts into the volume of savings available for investments for productive purposes. These investments are taken as determining the rate of economic growth, especially in situations where there is surplus labour to begin with.

83. Given a number of hypothetical assumptions about savings ratios and capital-output ratios, it is possible to compute projections which illustrate the magnitude of the gains in income *per capita* (or consumption unit) that would result from a reduction of fertility. The results actually compound two different kinds of gains—those which arise from the reduced dependency burden and those which derive from the increasing capital-labour ratio. The most immediate effect, when the case of declining fertility is compared with that of continued high fertility, is obviously that the number of children grows more slowly, while the productive age groups at first grow in exactly the same way. There is no dispute about this purely statistical implication of fertility reduction, and this change in the dependency ratio also accounts for the bulk of the estimated gains in the first decade or so.

84. The other assumptions behind this approach have become increasingly contested. It is argued that

[54] Food and Agriculture Organization of the United Nations, *loc. cit.*

[55] United Nations Secretariat, "Population and development", *Population Debate*, vol. I, part four, para. 19; "Economic-demographic models", *Population Debate*, vol. I, part four, paras. 19-21; Dharam P. Ghai, "Population growth, labour absorption and income distribution", *Population Debate*, vol. I, part four, paras. 4-15.

the savings ratio need not be reduced by high fertility. As far as household savings are concerned, the poor, who have the bulk of the children, do not save much, and the savings of the rich are not affected by the number of children. Business savings and, above all, government savings are dictated by entirely different considerations.

85. Moreover, the calculations of the growth consequences of high and low fertility conflict with many of the assumptions behind economic theories of fertility Crudely put, some macro-economic population models merely discover that if two parents have two children, they will halve the *per capita* income of the family. They may still prefer to have children, and the economic theories of fertility attempt to analyse that demand for children into its various components. One such component is obviously that children are a source of great gratification in themselves To include them merely as a burden and a charge on household resources, as in the analysis of the dependency ratio, is to leave out a fundamental welfare aspect of fertility On the other hand, it cannot be assumed that parents always have the number of children they want. On the contrary, there is much evidence that in the course of the demographic transition many parents have more children than they really want. The evidence for this is found in numerous surveys of attitudes and opinions, and in some countries also in the rising frequency of abortions Even when a disequilibrium of this kind arises from a welcome reduction in mortality, it may be a source of serious welfare loss to parents and children alike There is an enormous body of evidence to suggest that in families living close to the subsistence level, large family size is directly associated with malnutrition among younger children.

86. Above all, the notion that available savings dictate the amount of possible investment, which in turn determines the rate of economic growth, is criticized as too simplistic. The partial nature of this type of model is of particular relevance in view of the fact that in recent decades there has been an increasing recognition of the role of determinants of economic growth other than land or capital. In so far as the influence of the physical inputs of land and capital is overshadowed by technological progress, improvements in the quality of resources (including human resources), economies of scale and other productivity-raising variables, inferences based on models such as the one described may over-estimate by a substantial margin the quantitative impact of demographic factors on economic growth [56] However, there is not much agreement on any alternative theory of economic development This is of crucial importance, for without an adequate understanding of the process of growth and development, it can hardly be expected that the role of population in that process will be understood Moreover, even though capital and, for that matter, land, may not be the fundamental determinants of economic growth, an adequate supply of both is important for ensuring [illegible]

Population, employment and underemployment

87. Whenever the possibly harmful effects of rapid population growth are under consideration, it is impossible to ignore the question of the lack of employment, one of the major causes of poverty Despite this general concern with the problems of employment and unemployment, comparatively little is known about the way and extent to which they are affected by population trends There are different reasons for this, but prominent among them are problems of definition and statistical assessment The notions of employment, unemployment and underemployment are not very clear even in the developed countries where they originated and they are much less so in the developing Even in an industrialized country, where there is generally a clear distinction between the household and the labour market, the line between those who have a job and those who do not is at times blurred In developing countries, where the family economy dominates and self-employment plays a large role, such a border line often does not exist and any formal assessment of employment and unemployment and underemployment is virtually impossible

88. Even if the problems of definition and assessment could be overcome, many others, reflecting the complex nature of the determinants of labour force absorption, would crop up As a starting-point, it is evident that when population is growing rapidly, the labour force and the number of new job-seekers will also tend to increase rapidly, although not necessarily at the same rate as population It would, however, be over-simplistic to infer from this, as is sometimes done, that more rapid population growth will automatically result in a higher incidence of unemployment. Rapid population growth may be associated with an equally rapid increase of demand, leading in turn to a higher derived demand for labour. If these were the only factors involved, there would seem to be no *a priori* reason why the supply of labour should grow faster than the demand for it.

89. Much of the debate on the implications of population trends for employment in the developing countries has not centred on the problems of demand, but on the scarcity of the other factors of production, in particular, capital. An increasing labour force, according to the well-known reasoning, requires investments to provide the additional workers with the necessary materials Departing from this premise, a number of attempts have been made to assess the capacity for labour absorption under varying assumptions concerning the income effects of different rates of population growth. Assuming that a capital shortage

[56] United Nations Secretariat, "Population and development", *loc cit*, paras 18-20

exists, that it is responsible for initial unemployment and that capital formation will be accelerated by fertility decline, it is shown that lower fertility and population growth are associated with higher employment levels. In its simplest form, the explanation is that lower fertility has such an effect because it enables a larger proportion of national income to be saved and a larger proportion to be devoted to productive development outlays. Even so, the employment-creating effect, at least until the slowdown in labour force begins some 15 years after the fertility decline, is relatively small. It has been pointed out that it may easily disappear completely, if account is taken of the positive consequences which the more rapid capital accumulation may have on technical progress and productivity. Quite moderate productivity increases, which could be expected in response to the improved health, training and equipment of the labour force, may easily wipe out the initial gain in labour-force absorption resulting from the fertility decline. [57]

90. Most of the existing studies have given very little attention to, and very little is known about, the demographic impact on a set of factors which may prove to be decisive in determining employment growth. Called by one author the "pattern of growth", it refers specifically to the manner in which factors of production are combined and to the size of productive units. [58] In broader terms, it may be described as the problem of technology. The employment problem in the developing countries, it has been stated in this context, is a problem of the relationships between the rapid rate of population growth and the absence of an appropriate technology. The higher the rate of population increase, the more a radically different technology is needed to provide productive employment and prevent increases in poverty. The magnitude of the problem is suggested by a comparison of a more or less typical developed country with a developing one. The latter had a rate of labour-force growth of 3.3 per cent per annum compared with 0.4 per cent in the developed country. Hence, the developing country needed to find, per thousand population, 8 times as many additional productive employment opportunities as the developed one; but the resources it had available for this purpose were only one fifteenth of the total resources for each thousand population in the developed country. Thus, for each job required, only one hundred twentieth, or less than 1 per cent, was available for capital per job created. If the developing country had tried to provide the additional jobs in such a way that the jobs would be of exactly the same kind as in the developed one, less than 1 per cent of the total number of additional jobs would have been created. In fact, the distribution of employment by sectors and types is different in the developing countries and the resources required per job are lower. But the example shows that, unless the technology, nature and distribution of jobs are radically different, increasing unemployment is very difficult to prevent in developing countries. [59]

91. The problems of unemployment and under-employment in developing countries, however, are not to be found exclusively in this sphere. There exist in many of them serious imbalances in the supply and demand of labour in qualitative terms. These manifest themselves in specific skill shortages, as well as in maladjustments between professional specializations and the need for them, resulting not infrequently in highly qualified workers performing tasks far below their capacity and training. Moreover, it should be recalled that high labour mobility and the adjustment of supply to changing demand and the consequent unemployment is nearly inevitably associated with the process of industrialization in the developing countries.

Population, urbanization and industrialization

92. Despite certain qualifications, there can be little doubt that higher levels of geographical and occupational mobility are inextricably linked to the process of economic and social development and the growth of population. The recent decades have seen this confirmed, as industrialization and rapid population growth combined to speed up the transfer from agriculture to industry and services and, in particular, the momentum of rural to urban migrations and the process of urbanization. The world's urban population, as has been mentioned elsewhere, [60] is estimated to have increased between 1950 and 1970 nearly as much as in the whole of its past history. The pace of urbanization was even more rapid in the developing regions, where the urban population in 1970 was 2.5 times as large as in 1950. With about half of the urban growth from 225.9 million to 622.5 million being accounted for by migration, the economic and social significance of these movements is evident. [61]

93. Not only the rate of urbanization in the developing countries, but the balance of forces generating it differ considerably from those in the past. In the latter, urbanization was both antecedent and consequent of the increased productivity and higher levels of living associated with industrialization and development. In contrast, scarcity of agricultural land, low levels of agricultural productivity and insufficient productive employment, as manifestations of the pressures created by a rapidly growing population, must be seen as the fundamental factors in the influx of rural migrants into the cities. [62] In somewhat different terms it has been observed that, while in the currently developed countries, population growth certainly favoured rural out-

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[57] D. P. Ghai, *loc. cit.*, paras. 16-18.

[58] *Ibid.*, para. 20.

[59] H. W. Singer, *loc. cit.*, para. 6.

[60] See United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *loc. cit.*, para. 46 and table 14.

[61] *Ibid.*, para. 47.

[62] Philip M. Hauser, "Implications for economic development of world geographic distribution and urbanization" (E/CONF.60/SYM.I/18), paper submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973, p. 12.

migration, urbanization occurred fundamentally in response to industrialization Conversely, although the traditional factors attracting the rural migrant to the city have not been without importance, the rural exodus in the developing countries in recent decades has been overwhelmingly the result, direct or indirect, of rapid population growth [63] This is not to deny the importance of the economic and social factors underlying migration Even in the absence of population growth, the existence of considerable wage differentials between the agricultural and urban sectors, and the frequent belief that life is more attractive in the urban areas, would lead to some degree of migration, and therefore increase the labour force in the urban areas. Hence, the basic problem arises out of wage rate differentials, employment possibility differentials and the different degrees of productiveness of urban *versus* rural life. Nevertheless, population growth contributes to the problem in two ways. On the one hand, it may contribute by lowering the real consumption standard per person in the agricultural sector. On the other, it contributes by providing a greater number of people to migrate to the urban sector. If sufficient jobs are not created in the urban sectors, such migration leads to an enlarged pool of urban unemployed or partially employed. [64]

94 The less developed countries, it has been asserted, may be said to be over-urbanized in the sense that they do not currently have an adequate economic base to support their urban inhabitants at an acceptable standard. The most visible physical consequence of over-urbanization and rapid rates of urban growth is the decadence of the urban environment The city is characterized by a large proportion of shanty-towns and tenement slums; inadequate urban services, including housing, water-supply, sewerage, utilities and transport, uncontrolled land use; excessive population densities; deficient educational and recreational facilities; and inefficient commercial and marketing services. Rapid urbanization in the developing countries is accompanied by an urban environment which is not only defective but deteriorating. [65] Probably the best-known manifestation of over-urbanization is the great imbalance between labour supply and demand, revealing itself through the excessive size and growth of the tertiary sector and, in particular, through substantial underemployment and open unemployment. It has been estimated that, despite a significant increase in industrial employment, derived from a rapid expansion of industrial production, the manufacturing industries in the developing countries were unable to absorb more than 10 per cent of the rural surplus population between 1950 and 1960 [66] However, it should be borne in mind that part of the limited absorptive capacity of urban industrial employment reflects the effects of modern labour-saving techniques not adapted to the factor proportions in the developing countries As has been noted before, the problem of urban unemployment and underemployment is, in the developing countries, more than anything else one of rapid population growth and inappropriate technologies

95. The rapid growth of population, combined with the high degree of dependence on agriculture and the low labour requirements per unit of output in modern industry, imply a large and still increasing agricultural labour force in most developing countries It is not surprising, therefore, that, apart from the urban employment problem, the main manifestation of the insufficient capacity for labour absorption is a very high level of underemployment In the long run, only a more rapid increase in non-agricultural employment opportunities can solve the employment problems of the developing countries. But in the shorter run, when most of the population is in the rural areas and when the agricultural labour force is still increasing in absolute numbers, the agricultural and rural sectors have to bear much of the burden. [67]

Population and educational development

96 The importance of education as a fundamental component as well as a basic pre-condition for development is generally acknowledged. A certain level and content of education is essential for the development of the individual as well as society Conversely, education is also prerequisite to shaping the attitudes and motivations conducive to, as well as a fundamental part of, economic growth and social progress. It is in virtue of its nature as a condition for and component of development that education is affected by and affects population trends

97 Clearly, rapid population growth in the developing countries during the past decades has added significantly to the pressures on educational systems, but it has not been the only cause of such strains. Fostered in many cases by the attainment of independence, there has been a general concern in the developing world with the need for the rapid expansion of education and the opening up of educational opportunities for the population at all social levels. This evolution was further reinforced by an increasing awareness of the crucial role of human resources and education in economic and social development As a result, the qualitative aspects of education, prominent in the concept of human resources, came to be regarded on a par with the quantitative dimensions of the problem. The commitment to universal primary and greatly expanded secondary and higher education is firmly established, and these are the current targets of the development strategies and efforts of virtually all developing countries.

98. It is also evident that as far as educational prospects are concerned, the developing countries find

[63] P Bairoch, *loc. cit*, paras 24 and 46

[64] "Report of the Symposium on Population and Development", *loc. cit*, para 53

[65] P M Hauser, *loc cit*, pp. 12-14.

[66] P. Bairoch, *loc. cit*, paras 51-52

[67] See Food and Agriculture Organization of the United Nations, *loc. cit*, para 45

themselves in a much more unfavourable position than the developed ones, where education is much more advanced and virtually universal at the primary level and population growth is much slower. The growth of the potential school-age population in the developing countries, it has been observed, may be as high as 4 per cent per annum. Coupled with the desire of such countries to shift towards universal education at least at the primary-school level (frequently beginning from low current attendance levels, in some cases as low as 30 per cent), high rates of expansion in the demand for education can be visualized. Annual increases in enrolment of some 5-8 per cent may be fairly common under such conditions.[68] The relative importance of the population growth factor in educational development plans will, in actual conditions, vary with the initial levels of enrolment, the target to be attained and the period set for reaching it. It has been noted that estimates based on different assumptions with regard to the time period required to attain a given high attendance ratio show that, compared with what would be normal in the case of population growth at a relatively low level, under conditions of high fertility and population growth either a very intensive development effort or a decline in fertility would be necessary to attain the given increase in enrolment ratios.[69]

99. The effects that rapid population growth has on educational development are not limited to the obstacles it poses in the way of attaining the fundamental quantitative targets. Through the pressure of increasing numbers of students on educational resources, rapid population growth leaves little room for equally important qualitative progress in education. Resources that could otherwise have been devoted to improving pupil-teacher ratios, teachers' qualifications, buildings and other educational facilities, have to be spent on maintaining prevailing standards for the large inflow of students into the school system. The problems of educational quality in turn are generally considered to bear directly on the high incidence of school retardation. Higher costs per unit due to the wastage which can in part be attributed to the rapid increase of population thus seriously hamper the reduction of cost per student that is essential in the face of the rapid growth of their numbers.

100. The pressure of population apart from its effects on quantitative and qualitative educational development tends also to restrict the contribution that education can make towards greater social equality. As available resources are being diverted to providing basic minimum facilities to accommodate rapidly growing numbers of students, programmes to alleviate inequalities between the favoured and the underprivileged sections of population and regions, including those between boys and girls, rural and urban areas and different socio-economic classes, are greatly curtailed. The negative effects of high population grow and high fertility extend to the family. The large fam with many children may find it much more difficult th a smaller one to bear the cost of the children's educ tion, the more so because of the possible positi association between poverty and fertility. An additior factor is thought to bear on this problem. A numb of studies have suggested strongly that, when combin with poverty, large family size and the absence of prop child spacing seriously hamper the development of t children's cognitive, verbal and motivational capaciti as well as their health and physical development.[70]

101. In the developing countries, with high grow rates and fertility, younger age groups and the schoo age population account for a large share of the tot population. It may be recalled that the percentage children of primary-school age in these countri amounts, on average, to 24-25 per cent of the total, roughly one third higher than in the developed cou tries where percentages are 17-18. The lower propo tion of those of working age, who have to bear t major cost of education, further increases the burd of education as does the higher number of teache required per thousand of population.[71]

102. However, the foregoing remarks need to l qualified. It must not be overlooked that even thou rapid population growth is one link in the chain causation of the problem, the significant one is t demand for universal education. Very low or ze population growth would reduce the problem, but n eliminate it.[72] The point has also been made th population pressure, while acting as a major obstac to balanced educational development, may turn out be a positive element in bringing about long-neede educational reforms that might not be achieved educational systems were under less pressure. Furthermore, inadequate as some of the education ma be, it is better than none. Most important, continue educational development bears with it the attenuatic of fertility and population growth. A great many studi support the hypothesis that education, especially t education of women and their employment, usually i combination with other influences, is one of the elemen that facilitates or is responsible for the eventual declin of fertility that occurs in the course of socio-economi development.[74]

Population and health

103. Health interacts with population and develop ment, and tends to be an intervening variable betwee the two. Moreover, health itself is one of the majo

[68] "Report of the Symposium on Population and Development", *loc. cit.*, para. 50.

[69] *Ibid.*, para. 51.

[70] United Nations Educational, Scientific and Cultural Orga ization, *loc. cit.*, para. 34.

[71] *Ibid.*, paras. 29-31; "Report of the Symposium on Popu lation and Development", *loc. cit.*, para. 50.

[72] *Ibid.*, para. 54.

[73] United Nations Educational, Scientific and Cultural Orga ization, *loc. cit.*, para. 36.

[74] "Report of the Symposium on Population and Develop ment", *loc. cit.*, paras. 54-55.

objectives of development The mutual relations between health and population are complex and widespread. Mortality is directly influenced by health, fertility is linked to it both directly and indirectly, and migration is to a considerable extent influenced by it Conversely, population affects health in a number of ways.

104. Population trends themselves may contribute to the aggravation of health problems Population growth through pressures on the basic necessities of life, particularly food, and through crowding may cause health conditions to deteriorate. Changes in the age distribution may require considerable adjustments in the structure and type of health services Internal and particularly rural-urban migration may aggravate existing health problems through a combination of factors. [75] Moreover, population growth and other demographic changes give rise to a greater demand for health services and the rapid increase in numbers in the developing countries may severely strain resources Although, as has been frequently pointed out, health delivery systems jointly with nutritional supplements more than pay for themselves through the increase in labour quality and productivity, for many developing countries the budgetary claims of a traditional health system would be excessive The high-cost, one-to-one, doctor-to-patient relationship, and the provision of modern hospitals or clinics of the type found in major urban centres, cannot be financed. Rapid population growth in countries with low *per capita* income requires the expansion of low-cost services on a broad scale Delivery systems involving mostly auxiliary medical personnel and public health techniques at very low costs *per capita*, could, it is claimed, provide most of the health services needed. [76]

105. In recent years, abundant evidence has become available on the effects that high fertility may have on the health of children. The risks of stillbirth, infant mortality and child mortality are high with first births; they decline until the fourth birth and then increase with parity. Similarly, short birth intervals are found to have a deleterious effect on child health as well as on that of the mother. Other factors negatively associated with family size include: the height and weight of children; intelligence scores; a low incidence of malnutrition and common respiratory infections and gastro-enteritis. All these manifestations are, of course, linked by multiple causal relationships, and unobserved mediating variables may be more important than those that are observed In particular, social and economic conditions would appear to be among the major underlying causes. Nevertheless, as an element in child health deleterious to national development, the effect of parity and spacing on child health and growth may be an even more important consideration than mortality. [77]

106. Increasing attention has also been given to the proposition that the experience or expectation of high infant and child mortality may significantly hinder the movement towards lower fertility in much of the developing world Substantial reductions in child mortality may be an important, although perhaps not essential, means of encouraging a decrease in fertility in areas where both fertility and mortality are high Efforts directed specifically towards the reduction of child loss, and especially towards increasing perception of greater child survival, although not guaranteeing fertility decline, may shorten the demographically important lag between the decline of mortality and that of fertility rates This does not means that mortality decline "leads to" or "causes" fertility decline What may be true is that lower mortality either facilitates, or is a necessary condition for, the introduction of the incentives for lower fertility All studies are quite clear that among couples who experience child loss, attitudes towards contraception are less favourable, current usage is depressed and the timing of first use is delayed in comparison to couples without such loss It will be from a prospective evaluation of the magnitude of these effects and their consequences for fertility reduction that the case for investment in an attack upon infant and child mortality will be most persuasive. Combining health, nutrition and family planning services can yield obvious organizational and political benefits [78]

Demographic-economic models

107. An interesting and, in the opinion of some, important type of work undertaken in recent years involves attempts to create models of the economy that reflect both important aspects of the process of socio-economic development and the impact of population growth on various sectors of the economy Some obvious influences and sectors are the growth of the labour force, the effect of productivity on agriculture, the degree of migration from rural to urban areas, the demand for jobs in various categories, the demand for education, health and other welfare services, the requirements for supplying additional labour with the requisite additional equipment so that productivity per man is maintained or increased, and so on. For the most part, this work is in an experimental stage. There are difficult problems involved in determining the appropriate form and structure of the formalized system, and the exact equations to use in order to reflect the behaviour of human economic agents—and also in finding the necessary data to feed into the formalized system It is hoped that work of this kind will lead to a more sophisticated understanding of the complexity of the interactions between economic and demographic variables. It is also hoped that formal models will

[75] World Health Organization, "Health trends and prospects

[77] *Ibid.*, para. 46

[78] *Ibid.*, paras 47-48

clarify the exact meaning of certain concepts which are now used rather vaguely, that they will increase precision in the use of concepts and in the expression of relationships, that they will suggest explicitly the data that it would be useful for countries to collect, and so on. Clearly, should such models prove to be successful and lead to reasonably accurate predictions, it would help considerably in the work of calculating the costs and benefits of alternative population policies. By policies is meant not only specific family planning programmes, but those policies which influence social and economic variables or conditions, which in turn influence the motivations of households in determining the desired family size. [79]

108. Even if such models cannot make successful predictions, they may (if they are well formulated and if adequate and proper data are available) help in the assessment of the alternative consequences of alternative rates of population growth in specific development contexts. It is frequently very interesting to try to determine how sensitive a given development plan and its results are to different prospects of population growth. Also, if reasonably reliable, models of this type would make it possible to determine the consequences if current population trends were to continue well into the future. It is unrealistic to envision that current trends will continue indefinitely. However, it would be of interest to know what the consequences would be. There probably is enough knowledge currently available to assess the direction of future prospects and to encourage socio-economic development, including appropriate population policies and measures, in order to avoid unfavourable consequences of current demographic trends; but reliable models might make it possible to fashion policies that would bring people somewhat closer to optimal results and might suggest something about the urgency of such policies. [80]

109. There is one very significant logical obstacle to building population impact models able to predict successfully. It is not possible to have a clear-cut line of causation between population growth at one end and consequences at the other. This is because the consequences must depend upon other things occurring in the economy at the same time. For example, the consequences of population growth with a 5 per cent rate of investment will be very different from those with a 25 per cent rate. If innovations in agriculture shift agricultural practice from a single crop to a double crop per year, the consequences will be very different from what they would be if no such innovations were undertaken or attempted. Again, the consequences are likely to be different if a great deal is spent on education and on-the-job training, which in turn will affect the quality of labour, as against those cases in which very little is spent on education or where education is ineffective. It is easy to think of other examples, but the main point is that such models must be limited in their applicability, since it is difficult to conceive that they could predict enough about the other inputs into the economy to provide accurate information on the significance of the rate of population change. Nevertheless, such models may be extremely important in suggesting the different consequences of population change under alternative exogenous input-time patterns. Only the future can tell how useful they will turn out to be.

Population and social inequality

110. One of the most difficult problems for discussion is the relation between population growth patterns and social justice, in which income distribution stands as a crucial issue. [81] In part this is because we really have little understanding of the relationship between economic and social development and income distribution. To the extent that a generalization can be made, it is believed that more often than not the early stage of development is characterized by a great inequality of income and opportunity. Under the prevailing patterns in many countries, the development process tends to aggravate this inequality still further. In the majority of the developing countries, the various conventional quantitative indicators, such as total and *per capita* product and industrial production, reveal significant growth. However, these developments have been associated with certain characteristics that are unacceptable in terms of human well-being and individual welfare. The incapacity of the economic systems to absorb efficiently the growing labour force, the continued and possibly growing economic and social disparities between socio-economic groups, and the lack of participation of the entire population in the decision-making processes are only some of the manifestations of this problem. [82]

111. Although population growth patterns play a certain role, it would be misleading to state that the tendency is due mainly to these patterns. Recognition of their role should not lead to a neglect of other more important factors, but rather should result in placing the population issues within a wider framework of socio-economic development policies designed to support the attainment of greater social justice. Rapid rates of population growth put a heavy burden on educational capacities and may hamper the improvement of educational quality. The same is true, *mutatis mutandis*, of health services. However, these phenomena cannot be viewed only in over-all, aggregated terms. They have a clear impact on equality of opportunity and distribution of income and a particularly adverse effect on the poorest strata of the population.

112. The close inverse association between socio-economic levels and fertility levels is well known. Development and modernization affect different groups

[79] *Ibid.*, para. 62.
[80] *Ibid.*, para. 63.

[81] Enrique V. Iglesias, "Tendencias demográficas, desarrollo y distribución del ingreso en America Latina", *Population Debate*, vol. I, part four, paras. 4-5.
[82] *Ibid.*, para. 2.

in different ways. Historical experience and current data demonstrate that fertility decline takes place first in the higher income groups.[83] Such groups are then able to "invest" in their children's education and skills, and provide other types of opportunities By being the earliest to adopt a small family system, they achieve an advantage for their children as compared with lower socio-economic groups. By and large, the high fertility rates prevailing among the poorest sections of the population present a formidable obstacle to overcoming the existing great inequality of opportunity

113 The fact that the socio-economic groups with the highest fertility are also among the poorest signifies that the developing countries must not only take into account the problems of raising aggregate levels of income when population grows rapidly. In providing equal opportunities for all, their Governments must make allowance for the higher fertility of the poorer groups. By the same token, this circumstance indicates that redistribution of income and greater social equity are important elements in changing the reproductive patterns of the population segments with high fertility[84] In this connexion, it has been noted also that the economic effect of declining population growth and fertility may be less than is often assumed, since declining family size among the poorer income groups would have relatively little effect on consumption, saving and capital formation.[85] In addition, it should be remembered that policies designed to improve income distribution and socio-economic opportunities will, in the first instance, have the effect of decreasing mortality and thus of raising population growth.[86] Population growth also contributes to the problem through its effects on the degree of employment, since the problem of income distribution is to a great extent a question of productive employment It is from this point of view that a rough picture of the impact of rapid population growth on employment and income distribution can be obtained. Also important are the impact of internal migration and urbanization, and the living conditions of migrants It must be pointed out, however, that to a certain extent urbanization contributes to a better income distribution, in the sense that urban life gives access to social services and provides certain benefits that are not available in rural areas[87]

114 There are strong indications that age-distribution has a significant impact on income distribution. Young populations have a high dependency ratio, i.e. a smaller proportion of the population is of working age and as a consequence there is a higher ratio of family members dependent on those who work. This obviously contributes to a lower standard of consumption per family member This is particularly harmful, since children with their full productive life before them need more than adults the "human investment" which would be provided by a minimum income.[88] Since unemployment and relatively low incomes are more common among the young, countries with high fertility rates, where the proportion of young people in the population is higher, are also likely to have a more unfavourable income distribution Thus, reduction in fertility, the consequent change in the age distribution and a narrowing of the degree of differential fertility between socio-economic groups would contribute to the achievement of a more even international distribution of income The same is true within countries where high fertility and higher dependency ratios may be found among the lower income strata

115 The above-described reasoning does not imply that a simple decline in the fertility of the poorest population strata would lead to greater equality of opportunity There is a strong feedback interrelation between poverty and high fertility rates Although this feedback reinforced social inequalities in the past in many countries, the reverse of this mechanism may and should be used to achieve greater social justice This open alternative should be clearly perceived

Conclusions and implications

116 While apprehension about population growth is hardly new, it has assumed a world-wide dimension only recently as a rapid decline in mortality in very short periods combined with still high fertility levels has brought about an unprecedented increase in numbers It is deepened by the fact that the acceleration of population growth affected in particular the developing countries There is a clear prospect that by the end of the century, world population will reach from 6 thousand million to 7 thousand million, of which over 75 per cent is expected to live in countries currently classified as developing In the face of these prospects, increasing concern over population trends and their impact appears to be fully justified

117. Probably few other issues in the realm of economic and social problems are more complex and have given rise to more controversy than the question of the interrelations between population and development. Nevertheless, in recent decades, there has been considerable progress in the understanding of the processes and factors involved, even though substantial gaps in knowledge remain Moreover, while considerable differences of opinion remain, there are signs of a growing consensus about a number of fundamental issues This has made it possible to state with more assurance than ever before some of the considerations basic to policy decisions and formulation in the field of population and development. Drawing on the discussion in this document, the report of the Symposium on Population and Development and

[83] "Report of the Symposium on Population and Development", *loc cit*, paras 22 and 57, S Kuznets, *loc cit*, paras 18-20, E Iglesias, *loc cit*, pp 16-17

[84] E V. Iglesias, *loc cit*, paras 7-8 and 37-38, H. W. Singer, *loc cit*, paras 23-25

[85] E V Iglesias, *loc cit*, para 30

[86] *Ibid*, para 39

[87] *Ibid*, para 16

[88] H W. Singer, *loc cit*, para 14

papers submitted to it, as well as other background documents prepared for the World Population Conference, an attempt has been made to assemble in this final section some of these fundamental considerations.

118. In stating the problem of population and development, it is essential to recognize that the two are not independent. Population is an integral part of the process of economic and social development and its recognition as such is essential for a better understanding of the problem and the design of appropriate policies and measures. In this context, it is important to stress that population growth is not the main cause of the problems of development and that concern about population trends should not lead to a neglect of the critical issue, which is the problem of development. Development policies and programmes that promote more rapid economic growth and appropriate patterns of social change are essential to the solution of these problems. Population policies cannot be expected to solve these problems by themselves; however, as part of an integrated development policy, they can make an important contribution to a more rational development in the long run.

119. The understanding of the economic and social determinants and implications of population trends are basic for a fuller comprehension of the development process. In this context, it must be noted that there are strong feedback effects between population and development. The acceleration of population growth, which occurs in the early phases of development, as a result of the fall in death rates, which by itelf is a basic goal of development, occurs fundamentally in response to progress in health and economic and social conditions associated with incipient development. In the same manner, continued economic and social progress will contribute to and eventually result in the decline of fertility and of population growth to low or moderate levels. Lower fertility and population growth induced by economic and social development, in turn, facilitate and become the bases for subsequent economic and social development.

120. In reviewing in more specific terms the interrelations between population and development, it is necessary, as a first step, to distinguish the different positions and the great diversity of circumstances which exist in the world today. Most, but by no means all, developing countries are still in the phase of rapid or accelerating transitional population growth, in which a fall in mortality is not yet countered by one in fertility. In contrast, the developed countries have more or less completed the process of demographic transition outlined above. Passing from a régime of high fertility and mortality through a period of accelerated growth, as the fall of mortality was followed by the decline in fertility only after a time-lag, they are now under a régime of low mortality and fertility, characterized by low or moderate population growth.

121. While there exist in these countries social and economic problems associated with population trends and characteristics, on the whole they differ in natu and degree from those problems being faced by t developing countries. Among the problems often singl out are the increasing numbers and proportions at o ages, an alleged lack of mobility and adaptability such a population, the pronounced irregularities in t age and sex distribution, and in some instance inadequate access among the relatively impoverishe population groups to the information and means neede for the voluntary control of fertility. In recent year increasing attention has also been given to the role population in such longer term problems as t exhaustion of natural resources and the degradation the environment. However, the role of population i these problems would appear to be, on the whole, rather modest one compared with the influence modern technology and excessive urban concentratio

122. Moreover, since in a number of develope countries fertility is approaching the replacement leve the possibility of an eventual stabilization or eve decline can no longer be excluded. Although such possibility is less than imminent, because of the built in momentum of growth, the prospects of eventua stabilization or decline are viewed differently. While th cessation of growth or even a decline in populatio is viewed as desirable by some, for others such prospect is a source of concern and has given rise t efforts to stimulate fertility and population growth.

123. Concern about the implications for development of the upsurge in population growth in the developing countries is caused not so much by the increase itself as by its magnitude. The very steep and rapid decline in mortality combined with the maintenance of fertility levels, which were considerably higher than those of the countries of early industrialization at the time their mortality began to decline, has caused an unprecedented increase in population growth, much greater than any experienced in the past. There can be no doubt that these rates cannot continue indefinitely; but, on the other hand, there is little reason to believe that, in fact, they will. Historical and recent experience and the accumulated knowledge on the impact of economic and social change on population trends point to a decline of fertility and population growth provided development and modernization proceed. Nevertheless, there are many reasons for assuming that rapid population growth may continue for a considerable period to come.

124. Therefore, there exists a dilemma here. On the one hand, there is the expectation that as development continues the economic and social changes which are part of it will be associated with a decline of the birth rate. On the other hand, rapid development may be hampered as long as the current high rates of population growth persist, thus postponing the decline of fertility and the slowing-down of population growth.

125. The growth of population is not always an obstacle to development and lower population growth does not automatically cause a faster rate of development.

Neverthless, there is a consensus that very rapid population growth is usually an obstacle to development Recent economic and social trends in the developing countries suggest that rapid population growth has not prevented socio-economic progress in most cases. On the other hand, in a number of countries, population growth has outpaced economic growth, and, in certain individual sectors, progress has been very slow in comparison with population, a case in point being agricultural and food production Moreover, by almost any measure, the large differences in levels of living between more developed and developing countries are widening. In more general terms, it is true that rapid population growth places a heavy burden on economic and social systems in terms of the requirements it creates Resources for economic and social development are limited in the developing countries and rapid population growth is liable to put pressure on collective resources and the provision of social goods and services. Many countries find, therefore, that lower population growth and the characteristics associated with it, would lessen the burden on resources and facilitate the solution of their basic economic and social problems

126 However, it must be recognized that the extent and degree of the problems of population and development in the developing countries vary among regions and among individual countries. Within the category of developing countries, there are those with very high rates of population growth and others with comparatively low rates, some in which growth rates are still increasing and others in which these rates have started to fall In addition, there are great differences among countries with respect to population size and density, the levels and trends of urbanization and urban concentration, and so forth No less important in this context are the wide differences in levels and trends of economic and social development, and to those should still be added the implications of different cultures, traditions and political conditions This complex network of factors has to be taken into account in formulating policy recommendations.

127. If a slowing-down of population growth is desired, it is evident that of the two ways to achieve it—high mortality and fertility *versus* low mortality and fertility—the latter alternative is the only acceptable one. The goal of lower population growth can only be sought in the pursuit of means that lower fertility

128 The reduction of mortality and morbidity is a high priority in any type of society and an essential goal of development, aside from its indirect contribution to economic and social progress.

129. Voluntary informed decisions about the number of children and their spacing are a basic right of each couple and a constituent part of social welfare.

130. There is a growing body of evidence that fertility has declined in a number of developing countries. However, the effects which policies designed to lower fertility have had on this fall are not yet clear, but they probably have been relatively small Granted that the most favourable context for fertility decline is rapid and widespread development and modernization, there is, however, no reason to reject the common-sense assumption that family planning and educational programmes, as integral parts of development policies, may speed up the fall in fertility Moreover, there are indications that fertility may even decrease in relatively early stages of social and economic development, which suggests that programmes designed to reduce fertility need not be postponed until late in the development process There may also be some ground for optimism in the fact that just as recent mortality declines were steeper than in the past, where fertility has recently declined the fall has been more rapid than historical experience would have led one to expect

131 Because it is among the less privileged segments of the population that high birth rates are usually found, development policies should place special emphasis on promoting socio-economic change in these sectors Such measures would help to fulfil the basic development objective of social justice and contribute at the same time to a more rational and more favourable pattern of demographic behaviour.

132. The momentum of current demographic trends is considerable and rapid population growth in the developing countries, with their predominantly young age structure, is expected to persist for some time As long as current population trends continue, greater allowance should be made for the relevant population variables in the formulation of development plans and strategies Since the time dimension for significant changes in population trends is considerable, the need exists to shape developmental strategy so as to accommodate population trends that are not readily subject to modification

133 The strain on resources created by rapid population growth may be such that traditional policies may no longer be sufficient The creation of sufficient employment opportunities for the rapidly expanding labour force and the elimination of existing unemployment and underemployment, where they exist, require new and appropriate technologies adapted to the resource availabilities prevailing in the developing countries Likewise, the provision of health services to the rapidly growing populations in the developing countries requires the use of new health techniques at very low cost *per capita* and of auxiliary personnel on a broad scale In the same manner, the pressure of a rapidly growing number of students on the educational systems requires substantial reforms if the needed education is to be provided

134. Lack of sufficient employment opportunities, limited access to education, inadequate nutrition and poor health are among the factors that perpetuate inequalities in opportunity and income distribution, which in turn prevent declines in fertility. Social and economic policies should, therefore, as a matter of high priority develop programmes to improve [illegible]ome distribution and social justice C[illegible]

policies are the creation of sufficient employment opportunities, a more equitable distribution of income, a balanced development of agriculture and industry. All these policies should give special consideration to the provision of education and of employment opportunities for women outside the home. These policies should be complemented by programmes to reduce fertility among the least privileged strata of the population.

135. Intensified development efforts will not only alleviate the impact of current population trends, but will contribute to the attenuation of rapid population growth through the lowering of fertility. Social and economic development in improving the levels of living and quality of life is itself an important force in bringing about the eventual decline in fertility. Improvements in productive employment, health, education and even nutrition can be important factors in changing traditional reproductive patterns.

136. Special emphasis should be placed on the increased participation of women in economic growth and social development. The provision of educational, social, economic and political opportunities to women is not only a development goal in itself, but is likely to create the basic conditions that foster the reduction of birth rates. Lower fertility, in turn, is in many cases a necessary condition for the improvement of the status of women and their ability to participate fully in social and economic life.

137. Rapid population growth is also associated with high rates of internal migration and urbanization. Such migration responds at least in part to the restricted employment and other opportunities in the rural-agricultural areas, due in part to rapid rates of population growth. Development and population policie should include efforts to influence the flows of interna migration in order to produce a more balanced distribu tion of population adapted to future development.

138. Clearly, much deeper knowledge is require and study and research must be sponsored both at th national and international level in order to deepen th understanding of the relationships between populatio and development, in general and in different socio economic contexts. As a complement to action mor knowledge is urgently required, new tools and method of analysis must be developed; data collection must b improved and the acute shortage of qualified personnel in socio-economic and demographic research must b overcome. Greater international co-operation in this area can be exceedingly useful and is needed.

139. Current and potential world-wide population trends evidently cannot continue for as long as even one century without causing serious dislocations and crises in many areas. However, there is no reason to believe that population will continue to grow at its current rate. Spontaneous reactions might prove to be inadequate or less than optimal for solving the problem. But enough knowledge is available to encourage socio-economic development, including the appropriate population policies, so as not only to reduce the probabilities of disaster, but to foster sustained development in the levels and quality of life. International policy measures complementing national efforts, designed to achieve more rapid progress of the developing countries by way of trade, aid and transfer of appropriate technologies will contribute to this end. The world community should be fully aware of these considerations.

POPULATION, RESOURCES AND THE ENVIRONMENT

Report of the Secretary-General

1. The purpose of the present study is to examine some of the most important relationships between population, natural resources and environment, with man's socio-economic position occupying the centre of the study.* An attempt is made, at the outset, to define what resources are, which resources are essential to the well-being of the population, which are likely to be vital in the future, what substitutions and technological innovations might modify resource priorities and what limits are placed upon population and production by resource inadequacy

2. The relation of man to his environment is taken up next. The question is examined of the adaptation of man to his ecosystem, in terms of physical environment and biological components. In this respect, it is important to emphasize that man is not only a part of his ecosystem, but the most influential force in it He is, at once, its most resourceful asset and the most serious threat to it Thus, it follows that a global equation should include not only mineral, energy and food resources, but the quantity and the quality of human resources

3. The growth of population is a fundamental factor in its relationship to natural resources and environment. So far as population, resources and environment are concerned, data on total population and aggregate production do not generally lead to uncovering the underlying relationships, since knowledge of the structure and spatial distribution of population is also required in many cases Overcrowding and spatial concentration of population raise many problems of resources and environment (e.g., "external" or "spill-over" effects [1] of wastes produced in urban areas and the consequent pollution of air, water and land) There is not much evidence that the pattern of national population distribution will change radically in the near future. It would rather appear more likely that there will be an increased concentration of population as a result of growth and the coalescence of current nodes. It is estimated that, by the end of this century, more than half of the world's population will live in urban areas. In absolute terms, this means that if it should occur there would be an increase of nearly 2 thousand million city dwellers in the course of one generation. This significant increase of human urban settlements will have considerable global and national impact and will require substantial capital investment merely to maintain current levels of urban life. The current trends towards urban and metropolitan concentration may present mankind with the prospect of changes in life-style of unprecedented magnitude.

4 Population growth may not become a real threat to welfare in the advanced industrial countries in the near future, but if it should, it would probably be manifested in the deterioration of the quality of life. However, most developing countries which are embarked upon long-term economic development are confronted with an inadequate rate of growth of material welfare At current high rates of population growth, these countries can hardly achieve the desired rate of capital formation and the accompanying technological and institutional innovations required for the rate of economic growth to which they aspire It has often been stated that in the developing countries, science and technology, even if properly applied and adapted, would merely succeed in offsetting the effects of sheer increase in population

5. When both developed and developing countries are considered, the fundamental questions relating to the global situation can be expressed as follows how long can the natural resources of a finite world which comprises both static and dynamic institutions support growing populations at rising levels of living, in view of the physical limits to land surface, to the amount of fresh water moving through the hydrological cycle, and to mineral fuels and metallic ores? Or, ecologically speaking, can man ultimately establish a dynamic equilibrium (steady state) with his environment so that despite increased use of resources no destructive imbalance will result? As far as meeting man's mounting material needs is concerned, it should be noted that the ultimate supply is limited to the ordinary rocks, minerals, soil, water, air and sunlight, combined with human intelligence and ingenuity. However, no one yet knows accurately the potential mineral reserves, the amount of new land that can be made suited for cultivation, the degree to which fresh-wate supplies can be safely re-used, and, most rta extent

* For the report of the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973, see *Population Debate*, vol II, annex II

[1] "External" or "spill-over" effects occur when the economic activities of an individual or business enterprise adversely affect the economic activities or consumption of persons who have no market mechanism for obtaining compensation For example, toxic compounds in the smoke from motor-cars may impair the air and amenity of urban population

of human ingenuity in the continuous process of technological transformation. But it has been recognized that scientific and technological innovations have generally provided man with new imaginative tools to challenge nature.

6. With the concept of the earth as a "space ship", there has developed over the past few years a new awareness of the complex ecological relationships among man, natural resources and environment. It was long assumed that the demands made by the population were well within the capacity of the earth, as far as its ability to supply the physical and chemical requirements for continued life and to absorb the waste products was concerned. It is only recently that the view has been expressed that the limit of earthly carrying capacity, on a global basis, is about to be reached. As a result, particular attention has been directed to such problems as the cleanliness of the air and water, the effects of excessive use of pesticides upon soil and water, the availability of suitable surroundings for outdoor recreation and the impact of urban living upon the human body and mind. Also, questions have been raised as to the effects on oceans and terrestrial ecosystems of discharging into the environment such materials as oil and radio-active substances, or nutrients, such as phosphorus, which can enrich lakes and coastal areas.

7. Wastes, resulting from both production and consumption of goods and services, are increasing with population and economic growth. They become environmental problems when they have harmful effects on the biosphere. The environmental problems are known to depend essentially upon: (*a*) the growth of population; (*b*) the development of technology and its application to natural resources; and (*c*) the various degrees of side effects (first-order, second-order etc.) of technology. The trends of population and production have been upward over the past two centuries and so have been those of the emission of "pollutants". In the early stage of development, people were mainly concerned with such "first-order" effects of technology as the services obtained from railways, electric power, motorcars, fertilizers and pesticides, with little concern for the effects of the second or third order (e.g., pollutants). However, in the current phase of increasing sophistication of technology and its application to resources, there appears to be a profound shift in orientation, at least in the developed countries, towards taking into account all higher order effects of technology as well.

8. The importance of transferring the appropriate technology to the socio-institutional structure of the developing countries is today universally recognized. The difficulty, however, lies in selecting the particular technology that will not adversely affect "ecodevelopment". It is generally admitted that technology should be such as to be consistent with the system of values and aspiration of the local population and thus easily capable of being integrated into the social organization. In particular, those technologies which have already been tested under similar ecological conditions and been proved to have a destructive effect on the ecosystem should be avoided. Many harmful side effects of technology have been attributed to its application having transcended the scale for which it was originally designed. The concept of socio-economic development means far more than a mere transfer of the existing technology from the developed to the developing countries. As a result, before a particular technology from abroad is adapted to a developing country, it should undergo careful scrutiny in respect of its capacity to achieve the desired socio-economic objectives in its new situation.

9. Over the past decade, observations of world population growth, environmental disruptions and disparity in the levels of living of populations, as well as the realization of the intricacy of social problems, have led some scientists to invent what has come to be called "systems dynamics" modelling, which includes such factors as population, the social systems, technology and the natural environment. The concept sprang essentially from the preoccupation of scholars in recent years with the interactions of the above major factors rather than with the sum of the system's isolated parts; or, put more simply, from concern about the ways in which various factors influence one another on a world-wide scale.

10. The basic notion of system dynamics has been used extensively in economics for decades. However, in systems analysis, no effort seems to be made to identify relations between the models and the real world. There is generally inadequate reference to existing data or empirical studies. The "world model"[2] is constructed upon assumptions which are intuitively plausible to the model-builder, but without enough reference to existing knowledge. The behaviour of the model is then examined by calculating the dynamic paths of the variables. Logically, it would be necessary to make an empirical validation of the assumptions and the predictions of the model before affirming its truth, but it has been customary for the students of system dynamics to be content with subjective plausibility. The difficulty of validation is probably the essence of the dispute about the value of "systems dynamics" modelling. Another point worthy of attention is that the predictions of the world's future in these models are highly "sensitive" to the model's specification; that is to say, if the assumptions concerning population, technological change etc. are altered, most of these models behave in a dramatically different fashion.

11. In what follows, attention is focused first on the discussion of three broad classes of natural resources, namely, land and water, mineral and energy resources. Environmental problems are taken up second, begin-

[2] "World model" is not to be taken in the sense of modelling the world; it is intended to imply certain critical world-wide relationships. The expression is used merely to emphasize the global nature of the model.

ning with those of the developed countries, followed by those of the developing countries, and ending with global considerations. The discussion of various aspects of population and settlement comes next, followed by the impact of technological innovation and its transfer, and research. In the last section, an attempt is made to indicate some salient issues and policies and action inferences derived from the discussion of the various interrelationships elaborated in different parts of this report.[3]

POPULATION AND RESOURCES

12. Malthus' famous "principle of population" states that human populations will always increase up to a limit set by the food supply and that this limit is determined by the resources available for agriculture. Since his time, the concept of natural resources has been broadened to include all those things in the environment which can be used for human benefit and which require economic or political choices in their use. But Malthus' basic idea about the relation between population and resources still underlies much contemporary thought. This section examines the inverse of Malthus' proposition, which might be stated in the form of a question: can the effective use of resources be made to increase to limits set by human population size? Perhaps a more useful question is: how and to what extent can growing human populations utilize the resources available to them to support themselves?

13. Malthus recognized that production based on natural resources increases with improved technology and that the stock of resources can also be made to increase. But he thought that the rates of increase would always be less than the potential capacity of human beings to multiply their numbers. In his later writing, he conceded that in a quasi-stable situation where production was changing slowly, human populations would limit their numbers to a level which would allow almost all people to live well above bare subsistence.

The concept of natural resources

Definition of a natural resource

14. Natural resources should be defined more narrowly than simply as those things in the environment able, with the technology available at a particular time, to be used by human beings. The concept of a resource carries with it a notion of scarcity and value. Choices must be made about the purpose for which a resource is to be used, because it does not exist in sufficient quantity to be used for all possible purposes. Thus, until recently, in many countries, air and water hardly were thought of as resources, because they were so abundant that choices did not have to be made in their use.

15. Natural resources have commonly been classified in two categories—renewable and non-renewable. Water, air, land, forests and fisheries are in the first category, minerals and most energy sources are in the second. But the physical principles of conservation of matter and energy make the concept of a non-renewable resource doubtful. There is just about as much copper, iron and mercury on the earth as there ever was, and the quantity of energy entering and leaving the earth has remained virtually constant over geological aeons. What has been dissipated are the concentrations of metals in ore bodies and of chemical energy captured originally from sunlight in coal and other fossil fuels. The concentrations of metals in ores have been largely replaced by man-made concentrations in structures and machinery, although, of course, there is some dispersion of these materials into the environment, down to levels of concentration approaching those in ordinary rock.

16. With advances in technology, human beings are gaining the ability to extract, that is, to make man-made concentrations of, most metals from leaner and leaner ores. And the day can be foreseen when the most essential of these substances will be won from ordinary rock, provided sufficient energy can be concentrated for this purpose. On a long-term basis, the limitations on human activities and numbers set by renewable resources are probably more critical than those from the so-called "non-renewable resources". The finite area of the earth means that space on the earth's surface itself could eventually become scarce and, hence, a resource about which choices would have to be made. Indeed, this is already so in some countries. Fresh water and agricultural land, though still very abundant for the earth as a whole, are almost fully utilized in many heavily populated countries and this is also true of forests and fisheries.

17. Though natural resources can be thought of in one sense as physical phenomena, their dynamic relationship to technology implies a metaphorical definition: resources are ideas about the way in which things can be used. It is more useful, perhaps, to think of technology applied to natural resources as much more than engineering in the usual sense. Of at least equal importance are the social, organizational and political arrangements that make it possible for resources to be efficiently utilized.

Uneven distribution of resources

18. The uneven distribution of resources in different [illegible] incomes, one finds many combinations of resource abundance and population size; and this is equally true of the less developed countries, with their lesser technologies and low incomes.

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[3] [illegible] and Paul Singer

19. The reasons for these differences are grounded in part in the historical changes in the relative importance of different resources as technology has changed. In the past, the most important resources for the support of large populations were fertile agricultural lands and abundant water, and these characteristically occurred on the eastern, south-eastern and southern rims of Asia. Later, when coal and iron became pre-eminent in the countries that were developing the technology to use them efficiently, the populations of the coal and iron-rich countries of western Europe grew very rapidly. Water-short countries like Saudi Arabia and Algeria have "inherited" their small populations from the days when the absence of water for agriculture severely limited their population growth, even though they possess vast riches in petroleum. Other environmental and social factors played a large role. The 500-year persistence of plague, until the early nineteenth century, depopulated the Middle East. The populations of tropical and subtropical Africa were kept small by slavery and war, as well as by the lack of water or easily cultivated land. Ethnic conflicts and institutional deficiencies may have held back both technology and population growth in the South American countries. The "Protestant ethic" and a continent-wide market probably had as much to do with the vigorous population and economic growth of the United States of America as did the existence of abundant resources for agriculture and industry. In the modern world, the rise of international trade has made the efficient use of technology a more important factor in the economic growth of individual countries than natural resources. Japan and the Republic of Korea are examples of rapid economic growth despite extreme poverty in natural resources. On the other hand, the hopes of many developing countries for improvement in the conditions of life of their people rest upon their possession of abundant resources, which, in principle at least, could be traded for foreign exchange and the import of the technology they need.

20. The lessening importance of resources for the economies of the developed countries is well-illustrated by the recent history of the United States. From 1950 until 1968, the United States gross national product (GNP) in constant dollars just about doubled, but mineral and fuel production and consumption increased by only 30 per cent and 38 per cent, respectively. The value of these natural resources was equal to 3.7 per cent of the United States gross national product in 1950 and only 2.6 per cent in 1968.[1] For the world as a whole, the role of natural resources was slightly greater. The value of world production of the principal minerals and fuels in constant 1968 dollars more than doubled over this 18-year period, from $37,100 thousand [illegible] $77,400 thousand million in 1968.

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cultural peoples displaced by the reservoirs have not been completely solved in any country

24. The growth of cities commonly utilizes prime agricultural land Fortunately, the total area of cities is small, usually less than 5 per cent of the land area of even a highly urbanized country Both agriculture and cities and their industries are consumers of water In India, for example, the Irrigation Commission[5] estimates that 17 per cent of the usable water will be needed for industrial and municipal use, leaving a total of 720 thousand million m^3 for irrigation (out of a total estimated annual river flow of 1,800 thousand million m^3) The Commission's estimate of 7,600 m^3 for irrigating one cropped hectare does not appear to have taken water losses sufficiently into account Hence, their estimate of a total water use of 616 thousand million m^3 for irrigating some 80 million gross cropped hectares is probably low, and there may ultimately be a serious conflict for water between agricultural and industrial and municipal users.

25. Bangkok-Thonburi, the leading metropolis of Thailand, gives another example. The city's population is growing at about 6 per cent per annum, doubling in less than 12 years, and the country as a whole at 3 per cent, doubling in around 23 years The metropolitan water-supply comes from two sources: wells under the city and a diversion point on the Chao Phraya river some 30 km to the north[6] With rapid increase in food demand caused by population growth and rising incomes, more and more of the Chao Phraya waters are being used for irrigation agriculture above the city's diversion point. During the low flow season, the volume of fresh water remaining in the river, even when supplemented by water pumped from the wells under the city, is not much more than the volume that will be required for municipal use by the population of Bangkok in the 1980s The water-table under the city is being lowered by the pumping, and there is danger of subsidence and of salt-water intrusion into the river and the underground aquifer. This situation can be alleviated by the construction of up-stream dams on the river which would permit augmentation of low flow

26 An intrinsic feature of the Aswan High Dam in Egypt is that the water can be used for two purposes—irrigation agriculture and the generation of hydroelectric power But the difficulty with the multipurpose dams, in general, is that to use the electrical energy effectively for industrial development, it must be generated at the times and in the amounts needed Because most industries need to operate at a fairly steady rate throughout the year, their electric-power requirements are about the same during each season In contrast, agricultural needs for water vary widely

[5] Government of India, Ministry of Irrigation and Power, *Report of the Irrigation Commission* (New Delhi, 1972), pp 41-58 and 201-246.

[6] National Research Council of Thailand, *Water Pollution Control in the Bangkok Metropolitan Region*, research report (1973)

from one season to another Crop plants transpire t the atmosphere between two and three times as muc water in summer as in winter. If about the same are of land is cultivated through the year (such intensiv

in the winter If water is released from the dam in suc a way as to provide optimum economic benefits fo agriculture, the large variations from month to mont in the rate of generation of electric power will be fa from optimum for industry. On the other hand, if th water is released in accordance with the needs fo electric power, there is too much water for agricultur in fall and winter, and not enough in the summer

Potential water and land resources of agriculture

27 Human beings use both water and land for man purposes, but primarily for food production—that is the transformation of matter and solar energy into form that can be utilized for the growth and replacement of human tissue and to supply energy for huma metabolism

28 Food energy for 24 persons, i e , about 60,00 kilocalories per day, can be produced by one hectar of land at a level of agricultural technology (and o purchased inputs such as irrigation water, chemica fertilizers, high-yielding seeds, plant protection, farn tools and farm machinery) equivalent to that in man developed countries today Yet, for the world as whole at the current time, 1 4 thousand million hectare are cultivated to provide the food, fibres, and othe agricultural products needed by 3 8 thousand millio human beings There is one hectare of farm land fo every 2 7 living persons There are several explanation for the actual cultivated land per person being nearl 10 times the required area

(*a*) The land actually harvested during any particula year is about one half to two thirds of the total cultivated land The remainder is in temporary fallow an temporary meadows for mowing or pastures, or is no cropped for some other reason When chemical fertilizers are not used, much farm land must lie fallow fo a year or more to recover its fertility,

(*b*) About 10 per cent of the cropped area is devote to raising non-food crops—cotton, tobacco, rubber coffee, tea, jute etc ;

(*c*) Another large fraction is needed to produce foo for livestock Some of the livestock are used in cultivating the farms. The products from the rest, including butter, eggs, milk and meat, are eaten by human beings From a human standpoint, livestock are only from 10 to 15 per cent efficient, that is, they use from 7 t 10 times as much food energy as the energy containe in their edible products;

(*d*) From 10 to 20 per cent of the fo destroyed by pests and a for seed,

(c) The principal cause is the low level of agricultural technology in most of the world. Instead of more than 6 metric tons of edible food per cropped hectare, which is obtained in high-technology farming, the average Indian or Pakistani farmer produces only a little more than a ton of wheat or rice.

Potential arable land on earth

29. Large areas of the earth's surface are not now cultivated, but could be if farmers and the capital necessary for development were available. In appraising the total quantity of arable land and its potential for food production, four factors should be considered, namely, the area of land that could be cultivated, the quality of this land, the total water-supply available for irrigation and the geographical distribution of currently uncultivated but potentially arable land in relation to the geographical distribution of the world's population. The area of potentially arable land is limited by:

(a) *Climate*. The land surface of the earth outside the ice-covered areas of Antarctica and Greenland is 13 thousand million hectares (132 million km^2). Of this total area, 1.9 thousand million hectares are non-arable because temperatures below freezing occur during nine or more months of the year. In an additional 2.6 thousand million hectares, there are less than three months of the year in which available moisture, either from rain and snow or from water stored in the soil, equals or exceeds evapo-transpiration from plants and soil, and there are no feasible sources of irrigation water. Climate alone, therefore, limits the area of potentially arable land to 8.5 thousand million hectares (85 million km^2);

(b) *Soil*. The soil must meet the following conditions:

(i) It must be permeable to water and to plant roots: the soil is the medium or substrate that holds the plant roots, and the roots must be able to extract water and plant nutrients from the "soil solution"—the liquid existing in the interstices between solid particles. At the same time, it must be possible for water to pass through the soil and be drained off, carrying unwanted salts away in solution;

(ii) It must be capable of holding water and nutrients: if the soil is too sandy or consists mainly of iron and aluminium hydroxides it will not retain water, and plant nutrients will be washed out of it before they can be utilized by the crops;

(iii) It must be neither too acid nor too alkaline. Excessive acidity can usually be alleviated by adding lime, and alkalinity by washing the soil if drainage is available;

(iv) Its surface must not be too steeply sloping or irregular;

(v) The soil must not be too rocky.

The following land and soil types contain large areas of non-arable land. These overlap with the climatic limitations described above.

Land or soil type	*Non-arable area (thousand millions of hectares)*	*Reason for being non-arable*
Tundra	0.5	Too cold
Desert	1.9	Too dry, or too stony, rough and hard
Lithosol (rocky)	2.6	Too little soil; mostly rock
Regosol (sandy)	0.7	Too rough, unstable and coarse-grained
Latosol (lateritic)	1.4	Becomes hard and impermeable after drying
Podzol (forest soils)	1.6	Too steeply sloping, thin, stony or cold
All others	1.3	Too cold, undrainable, rough, thin, rocky or steeply sloping
	10.0	

SOURCE: Roger Revelle and others, "Water and land", in United States of America, President's Science Advisory Committee, *The World Food Problem, A Report of the Panel on the World Food Supply* (Washington, D.C., 1967), vol. II, pp. 405-469.

The remaining 3.2 thousand million hectares (32 million km^2) are arable. This is 24 per cent of the land area of the earth, about 2.3 times the currently "cultivated" area, and more than three times the area actually harvested in any given year;

(c) *Water-supply*. Water must be available in growing season in amounts equal to or greater than evaporation from the soil and transpiration from the plants. The total amount of rain and snow falling on the earth each year is about 470,000 km^3: 370,000 on the ocean and 100,000 on the land. Over the ocean, 9 per cent more water evaporates than falls back as rain. This is balanced by an equal excess of precipitation over evaporation on land; consequently, the volume of water carried to the sea by rivers and coastal springs (and in small part by glaciers) is close to 32,000 km^3 per annum.[7] About 18,000 km^3 is carried by 69 major river systems from a drainage area of 56 million km^2. Somewhat less than half the run-off of liquid water from the land to the ocean is carried by thousands of

[7] Roger Revelle, "Water", in *Technology and Development*, prepared by *Scientific American* (New York, Alfred A. Knopf, 1963).

small rivers flowing across coastal plains or islands; the area drained is about 44 million km², but part of this is desert with virtually no run-off.

30 Inland seas, lakes or *playas* receive the drainage from 32 million km². This includes most of the earth's 24 million km² of desert and also such relatively well-watered areas as the basins of the Volga, Ural, Amu Darya and Syr Darya rivers, which transport several hundred thousand cubic kilometres of water each year to the Caspian and Aral Seas Irrigation agriculture represents man's principal deliberate use of water; but, at the current time, it takes little of the available supply. A little over 1,000 km³—less than 4 per cent of the total river flow—is used to irrigate 160 million hectares (1.6 *million km²) or about 1 per cent of the land area* of the earth [8] About 10 times this quantity of rainfall and snow-fall is evaporated and transpired each year from the remaining 1.25 thousand million hectares of the earth's cultivated lands and helps to grow food and fibre. Most river waters flow to the sea almost unused by man, and more than half of the water evaporating from the continents—particularly that part of th evaporation taking place in the wet rain forests an semi-humid savannahs of the tropics—plays little par in human life

31. The potential for irrigation development is thu very large, but it is limited by the uneven distributio of river run-off between the different continents an within different climatic zones on each continent. Abou a third of the total run-off comes from South America with less than 15 per cent of the earth's land area while Africa, which contains 23 per cent of the land yields only 12 per cent of the run-off Run-off fron south-west Asia, North Africa, Mexico, the south western United States, temperate South America an *Australia is less than 5 per cent of the total; yet these* regions contain 25 per cent of the land area

32. As a result of the uneven distribution of run-off only 30 per cent of the land that is potentially arabl only with irrigation can actually be irrigated, and th potential increase of gross cropped area through irri gation development is limited to 1,110 million hectares The total potentially arable land is thereby reduced t 2,925 million hectares and the potential gross croppe area to 5,562 million hectares Table 1 shows the tota potentially arable land on each continent and the poten-

[8] Roger Revelle and others, "Water and land", in United States of America, President's Science Advisory Committee, *The World Food Problem, A Report of the Panel on World Food Supply* (Washington, D C, 1967), vol II, pp 405-469

TABLE 1 POTENTIALLY ARABLE AND IRRIGABLE LANDS AND POTENTIAL GROSS CROPPED AREA

(Millions of hectares)

	(1) *Potentially arable land*	*(2)* *Potentially arable without irrigation*	*(3)* *Potentially arable only with irrigation*	*(4)* *Total irrigable area*	*(5)* Potential gross cropped area *Without irrigation*	*(6)* *With full irrigation*	*(7)* *With available water*
Africa	730 (620) [500]	600 (490) [490]	130 (130) [10]	610 (610) [290]	820 (500)	1,980 (1,660)	1,110 (790)
Asia	620 (540) [465]	530 (450) [450]	90 (90) [15]	410 (410) [355]	830 (590)	1,460 (1,220)	1,340 (1,100)
Australia	150 (150) [122]	120 (120) [120]	30 (30) [2]	110 (110) [2]	150	330	152
Europe	170 (170) [170]	170 (170) [170]	— — —	30 (30) [30]	230	270	270
North America	460 (450) [450]	440 (430) [430]	20 (20) [20]	170 (170) [160]	630 (590)	840 (800)	790 (750)
South America	670 (370) [370]	640 (340) [340]	30 (30) [30]	310 (310) [80]	1,420 (520)	1,900 (1,000)	1,500 (600)
USSR	350 (350) [350]	320 (320) [320]	30 (30) [30]	30 (30) [30]	370	400	400
WORLD TOTAL	3,150 (2,650) [2,427]	2,820 (2,320) [2,320]	330 (330) [107]	1,670 (1,670) [1,027]	4,450 (2,950)	7,180 (5,680)	5,560 (4,060)

SOURCE: United States of America, President's Science Advisory Committee, *The World Food Problem, A Report of the Panel on World Food Supply* (Washington, D C, 1967), pp 432-433, and calculations from previous table Minor in- [illegible] (1), (2), (3) and [illegible] ith availa water. [illegible] hu ics

tial gross cropped area, that is, the sum of the potentially arable areas multiplied by the number of four-month-growing season crops that could be grown in each area, with and without irrigation. Without irrigation, three crops could be grown on 5 million km^2 in the humid tropics, and two crops on 6 million km^2 in subhumid regions. One crop could be grown without irrigation on 17 million km^2. Thus the potential gross cropped area (the cultivated area times the number of crops), without irrigation, is 45 million km^2 (4.5 thousand million hectares). If enough water were available for irrigation, the gross cropped area could be as much as 72 million km^2 (7.2 thousand million hectares). Irrigation is necessary to grow even one crop on 3 million km^2 of potentially arable land.

New technology is needed for the humid tropics

33. Of the potential gross cropped area, 1.5 thousand million hectares lie in the humid tropics where rainfall is more or less continuous throughout the year. No technology exists today for intensive cultivation of these lands for food production because of the highly leached nature of the soils and their consequent inability to retain plant nutrients. Except for the island of Java and a few similar places with very deep, recently formed volcanic soils and for certain tree crops in other areas, farmers in the humid tropics still practice the ancient technique of "slash and burn" agriculture. A new technology for intensive food production may require genetic development of food-producing trees, which can retain and recycle fertilizers in a carpet of organic matter on top of the soil. [9]

34. The available evidence, especially from the impressive research in central Africa, supports the prospect that, with appropriate technology, development in the humid tropics could have a tremendous potential for food production. The Belgians, for example, before suspending their research in the Congo, [10] had developed an oil-palm which, when properly grown, yielded about 4,000 kg per hectare whereas the ordinary palm yielded about 500 kg per hectare. In the humid Amazon Valley, peppers have been grown successfully by several colonies of Japanese immigrants for at least 20 years. Considering only the technology currently available, however, the figures given above need to be reduced by omitting most of the area of 500 million potentially arable hectares within the humid tropics. The world areas of potentially arable net and gross cropped land then become approximately 2,430 million and 4,060 million hectares, respectively.

Number of people that could be fed

35. About 10 per cent of the gross cropped area will continue to be needed to grow fibres, beverages and other non-food products. With appropriate technology and sufficient purchased inputs of production (irrigation water, fertilizer, high-yielding seeds, plant protection, farm tools, farm machinery and farming practices based on scientific knowledge), equivalent to those used in Iowa corn-farming, the remaining 3,650 million gross cultivated hectares could be made to produce:

$$6 \times 10^4 \times 3.65 \times 10^9 = 2.2 \times 10^{14} \text{ kilocalories/day}$$

36. Allowing 10 per cent of this amount for unavoidable losses, and another 3 per cent for seed, the remainder would be enough to provide a minimum subsistence diet of 2,500 kilocalories per day for 76 thousand million people.

37. To provide an adequate diet, including sufficient high-quality protein (protein with the balanced content of amino acids required by human beings and all other warm-blooded animals except cattle and related ruminants) and "protective" foods, such as fruits and vegetables, the equivalent of from 4,000 to 5,000 kilocalories/person/day is desirable. The potential gross cropped area would then be sufficient for from 38 thousand million to 48 thousand million people, i.e., from 10 to 13 times the current human population of the earth. Setting aside the question of whether such a large human population would be desirable, or even possible from other points of view, one may ask what the obstacles are to the potential expansion of the earth's cultivated area. These are of several kinds.

Quality of arable land

38. The savannahs of South America, and the broad belt that extends from east to west across Africa just south of the Sahara, contain large areas of reddish-brown and yellowish-brown lateritic soils and latosols. These are among the most severely weathered and leached soils of the world. Their meagre supply of plant nutrients is barely enough to support cropping for from two to four years, after which long periods—from six to 12 years or more of fallow—are necessary to restore their limited productivity. These soils are almost universally low in phosphorus and they have the unfavourable feature of "fixing" phosphorus fertilizer and thereby making it unavailable to plants. On the other hand, many of them are permeable to both air and water, easily penetrated by roots to great depth, easy to keep in good tilth and have at least moderate water-holding capacity. With adequate irrigation water, chemical fertilizers and soil conditioners, these soils could be made highly productive of a wide variety of food crops. In the northern part of the sub-Saharan region, large areas of regosols exist—sands which are highly susceptible to blowing and have such a low water-holding capacity that their potential for crop production is severely limited.

39. In other potentially arable lands, considerable soil improvement (e.g., by addition of large quantities of lime) is necessary.

[9] J. G. Horsfall and others, "Tropical soils and climates", in United States of America, President's Science Advisory Committee, *The World Food Problem, A Report of the Panel on the World Food Supply* (Washington, D.C., 1967), vol. II, pp. 472-500.

[10] Now the independent State of Zaire.

Continent	Estimated population (millions)		Arable land (millions of hectares)		Percentage of potential already cultivated	Cultivated area per person (hectares)	
	1965	1985	Potential	Cultivated		1965	1985[a]
Africa	310	515	500	160	32	0 5	1.0
Asia	1,855	2,700	465	470[b]	101	0 3	0 2
Australia and New Zealand	14	25	120	20	16	1 4	4 8
Europe	445	490	170	150	88	0 4	0 3
North America	255	330	450	240	53	0 9	1 4
South America	197	390	370	80	21	0 9	1 4
USSR	243	295	350	230	66	1 0	1 2
TOTAL	3,320	4,745	2,425	1,350	56	0 4	0 5

[illegible] inconsistencies are due to rounding errors

[a] Assuming all potentially arable land is cultivated

[b] In Asia, some humid tropic land is cultivated

Capital investment requirement

40. In general, any major extension of the earth's cultivated area, even for subsistence agriculture, would require a huge capital investment, of the order of from $500 to $1,000 per hectare. [11] The cost of putting all the potentially arable land outside the humid tropics under cultivation would be from $500 thousand million to $1,000 thousand million The higher figure is about equal to the annual gross national product of the United States and twice that of all the developing countries.

Uneven distribution of population and arable land

41. Seventy per cent of the world's peoples live in Asia and Europe, where nearly all the arable land is already cultivated and the remainder can be brought under the plough only at the expense of the large-scale development of irrigation. The potential for increasing the net cultivated area is also relatively small in the Union of Soviet Socialist Republics. Most of the uncultivated but arable land is in the more sparsely populated continents

42. In table 2, the quantity of potentially arable land outside the humid tropics in which sufficient water is or could be made available on each continent is compared with the currently "cultivated" areas. By "cultivated" area is meant the lands designated by the Food and Agriculture Organization of the United Nations (FAO) as arable land and land under permanent crops, including land under crops, temporary fallow, temporary meadows for mowing and pasture, market and kitchen gardens, fruit-trees, vines, shrubs and rubber plantations. [12] Within this designation there are said to be wide variations within reporting countries. The area actually harvested during any particular year is about one half to two thirds of the total cultivated land.

43 Human diets in Asia are insufficient today. If the Asian peoples are to obtain sufficient food from their own farm lands in the future, it will be necessary to increase yields, that is, the weight of each crop per hectare of cultivated land and, wherever possible, to grow two or three crops per year on each cultivated hectare. The climate in nearly all potentially arable but currently uncultivated land in Asia is so arid that even one four-month growing season is impossible without irrigation; and water-supplies are inadequate for more than about 15 million hectares Within the currently cultivated area, double- or triple-cropping will usually require extensive irrigation development.

44 As tables 1 and 2 show, in Africa and South America, counting the humid tropic areas, there are nearly 1.4 thousand million hectares of potentially arable uncultivated land with sufficient water (not much less than the total currently cultivated area of the earth) while the figures above show only 240 million cultivated hectares. Outside the humid tropics, 630 million hectares with sufficient water remain uncultivated The limiting factors in agricultural development in these continents are not natural resources, but economic, institutional and socio-political problems In addition to potential land in Africa and South America, over 300 million potentially arable, but not cultivated, hectares exist in North America and Australia

Energy needed for increasing productivity

45. With modern agricultural technology, the use of energy from fossil fuels is equal to about three fourths of the food energy in the crops. [13] Table 3 illustrates how this energy is utilized in irrigation agriculture in the United States of America

46. On average, the developing countries now use about 400 kg of coal equivalent per person per annum,

[11] [illegible]

[13] David Pimentel and others, *Corn, Food, and the Energy Crisis*, report 73-1 (Ithaca, N.Y., Cornell University, Department of Entomology and Section of Ecology and Systematics, 1973), pp 1-37

TABLE 3. UNITED STATES OF AMERICA: ESTIMATED ENERGY CONSUMPTION FROM FOSSIL FUELS ON FOOD

	Item	*Millions of kilocalories per ton of food-grains* [a]
(1)	Irrigation water	0.78 [b]
(2)	Chemical fertilizers	0.71 [c]
(3)	High-yield seeds (varieties that are highly responsive to chemical fertilizers)	0.03
(4)	Plant protection against diseases and pests	0.01
(5)	Farm tools and farm machinery	0.44
(6)	Fuel for operating farm machinery	0.40
(7)	Scientific knowledge required for improved practices	...
(8)	Electricity	0.16
(9)	Transportation facilities (roads and trucks)	0.04
(10)	Crop drying	0.06
(11)	Storage and marketing facilities	0.01
(12)	Food-processing facilities (flour and sugar mills, food preservation plants etc.)	0.22
	TOTAL	2.86

SOURCE: For items (2)-(12), David Pimentel and others, *Corn, Food and the Energy Crisis*, report 73-1, (Ithaca, N. Y., Cornell University, Department of Entomology and Section of Ecology and Systematics, 1973), pp. 1-37.

[a] One ton of food-grains contains 3.5×10^6 kilocalories.

[b] Assuming electric-powered pumps, 0.6 metre evapo-transpiration, water pumped from 20 metres, 50 per cent water course and field losses.

[c] 130 kg of N, 34 kg of P, 70 kg of K per hectare.

corresponding to an annual use of 3 million kilocalories per person.[14] Thus, to meet his dietary needs adequately with high agricultural technology, a person in a developing country would need to use for food production about a third of all the energy available to him at the current time. In contrast, the average person in developed countries uses 14 times as much fossil fuel energy as that required to meet all his agricultural requirements, even though the high proportion of animal product in his diet means that he is consuming from three to four times the number of plant calories of the average person in a developing country.

47. The common metals are so abundant in the earth's crust and the technical possibilities of substitution of other materials for the rarer ones are sufficiently promising as to make the losses by dispersion not very worrying. This is not true of phosphates. There is no substitute for phosphorus in plant or animal metabolism, and hence it is an essential component of fertilizers for agriculture. But most of the phosphates in farm fertilizers are lost in human and animal wastes. In 1968, 7.6 million tons of phosphorus were used for fertilizer. To feed the expected world population of from 6 thousand million to 7 thousand million people in the year 2000, it may be necessary to raise the annual use of phosphorus in fertilizer to from 30 million to 40 million tons. With current agricultural technology, an increase of farm yields by 100 per cent requires a 270 per cent increase in fertilizers.

48. Potential recovery of phosphorus from the known reserves of high-grade phosphate rock has been estimated at 18 thousand million metric tons.[15] At the expected rate of use by the beginning of the twenty-first century, these reserves would be used up in from 450 to 600 years. Additional phosphate-rock reserves of lower grade are known to exist. These reserves have been estimated by mining engineers to contain about eight times the amount of phosphorus in the deposits that are economically mineable today. Phosphate concentrations of still lower quality occur in many different countries. But with foreseeable technology, the higher cost of extracting the phosphorus from these low-grade deposits would cause a sharp rise in the cost of phosphate fertilizers and, hence, in food costs. Eventually it may be less expensive to recover all the phosphorus that is now removed from the soil in crops and in animal products and to re-use it for food production.

Agricultural modernization

49. The quantity of potentially arable land on earth is so much larger than the area actually cultivated today and the possibilities for increasing agricultural production on currently cultivated lands are so great that the area of the earth's surface that will be devoted to agriculture in the future is chiefly an economic and social variable, which differs from country to country, rather than a physical one. In the developing countries, raising the level of agricultural technology is essential to increase the yields from cultivated land and to bring many currently uncultivated areas under the plough. The basic requirement is the creation of better con-

[14] Joseph L. Fisher and Neal Potter, "The effects of population growth on resource adequacy and quality", in National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications* (Baltimore and London, Johns Hopkins Press, 1971).

[15] G. D. Emigh. "World phosphate reserves, are they really enough?", *Engineering/Mining Journal*, April 1972, pp. 90-95.

ditions for market agriculture, as contrasted with subsistence agriculture, because high agricultural technology depends upon the ability of the farmers to purchase and of society to produce many "inputs", or factors of production, from outside the farm [16]

50. If the world's growing populations are to be fed, agriculture must be modernized. Such modernization depends upon over-all social and economic development, as well as upon the development, application and dispersal of knowledge A high degree of industrialization and of governmental and other institutional development is required Social and economic development (in the form of increases in incomes *per capita* and a more equitable income distribution) is probably also a necessary condition for a significant and continuing reduction in rates of population growth and ultimately for a stationary world population Here one is faced with a paradox attainment of the earth's maximum carrying capacity for human beings would require a very large degree of agricultural modernization and, hence, social and economic development But such development would be likely to lead to a cessation of population growth long before the maximum carrying capacity is reached The developing countries confront a more immediate problem In terms of both employment and production, agriculture is an overwhelmingly important component of their economies, agricultural modernization is essential for their over-all economic development because it will create a consumer surplus which can be saved and invested in other economic sectors But at the same time, agricultural modernization depends upon over-all economic development because it requires many inputs from outside agriculture and a large and growing market for agricultural products

51. Ecological deterioration caused by human agricultural activities is much more likely to occur through the expansion of traditional agriculture into an unsuitable or easily damaged environment than through agricultural modernization, which from many points of view leads to environmental improvement. Nevertheless, agricultural modernization, particularly the use of wide-spectrum pesticides and excessive quantities of fertilizer, and the elimination of potentially valuable components of plant and animal gene pools, has also been environmentally destructive One of the kinds of knowledge that needs to be sought through research is that necessary to minimize environmental deterioration

52. Agricultural modernization in the developing countries is one of the great challenges facing mankind. For the sake of future human welfare, it must take place much more rapidly than population growth, so that levels of living can be raised, and opportunities for improvements in the conditions of life can be increased If it does not take place quickly, it may not be possible at all The developed countries have an essential role to play in the first stages of this modernization, because they possess a large share of mankind's current ability to gain the needed knowledge through research.

Non-fuel mineral resources

53 Because metals and other useful non-fuel mineral substances do not disappear, the average concentrations of these substances in the earth can never go below the average concentrations in ordinary rock Higher concentrations exist in the ores from which the metals have been won for thousands of years But most of the known rich deposits have long since been worked out, and the world-wide industrial civilization has been forced to develop technologies for working ores of lower and lower grades For some metals, e g , copper, iron, manganese, aluminium, titanium, nickel, lead, zinc and molybdenum, the quantities of metal rapidly increase as the grade of ore becomes lower. Up to the current time, improvements in technology have reduced the cost of mining, processing and transporting a ton of ore about as rapidly as the average grades of ore have diminished.

54 One of the consequences has been that estimates of the world's known and potential reserves (metals recoverable with current technology at approximately current prices) have greatly increased during the past 20 years. For example, estimates of the known quantity of iron ores have gone from 19 thousand million to 251 thousand million tons, and estimated reserves of copper have increased nearly threefold. Further cost reductions from improvements in technology, or rising prices, may allow from a hundredfold to more than a thousandfold increase in the volume of reserves. But with a given technology, the cost of obtaining a ton of metal increases rapidly when the grade of ore goes below a certain level This results from the fact that, at very low grades, the quantity of metal available in any given grade of ore does not increase as rapidly as the grade diminishes At some point in time, the curve of increasing costs with lower grade is likely to cross the curve of decreasing costs with improved technology This point may already have been reached with copper, but it may never be reached with iron and aluminium because the concentrations of these metals in ordinary rock are so high—about 7 per cent for iron and 14 per cent for aluminium For some other substances, including mercury, tin, tungsten and helium, there is a sharp discontinuity in concentrations between usable deposits and the average concentration in the earth The currently known deposits are likely to be worked out in the next few decades. After that time, only very large price increases would make it possible to [illegible] to obtain these substances from the natural environment. Besides improvements in the technology of [illegible]ering and processing ore deposits, four other [illegible] are open to the world society in order to [illegible] needed supplies of metals: (a) reduced [illegible] (b) exploration for and discovery of new [illegible] recycling, and (d) [illegible] of other

[16] T W Schultz, "Food for the world an economist's view", Agri-economics research paper 72-2, Chicago, University of Chicago, 1972, pp 1-28

materials. Only the third and fourth alternatives can be relied on for the long run. But these as well as the other alternatives will involve increased uses of energy.

55. Contrary to common belief, the *per capita* consumption of metals in developed countries does not increase exponentially with rising incomes. After a certain level of *per capita* gross national product has been reached, the tonnage of metal used per unit of GNP actually diminishes. In the 1940s, 5 tons of copper were used in the United States for every million dollars of GNP; the amount is now less than 2 tons. Similarly, *per capita* consumption of steel in the United States remained nearly constant at about 600 kg between 1950 and 1970, while *per capita* incomes at constant prices just about doubled.

56. Taking all the developed countries together, however, *per capita* metal consumption more than doubled between 1950 and 1970; this was also true of the developing countries of Asia and Latin America. Because of the rapid rates of population growth of the developing countries, their total metal consumption increased between threefold and fourfold, even though in 1970 it was only about a tenth of the total in the rich countries. Continued economic growth in the poor countries, which is essential if they are to escape from poverty, implies a closing of this enormous gap in consumption of metals. Thus, even if metal consumption in the rich countries were to remain constant or decrease during the next 30 years, total world consumption could be expected to grow. A decline in consumption by the rich countries is unlikely; but if it occurred, it would not help those poor countries which depend upon metal exports for foreign exchange to purchase the capital goods and technology they need for economic growth.

57. In the past, exploration and discovery of mineral deposits by aerial photography or ground prospecting has been severely handicapped in humid tropical areas by the heavy vegetation, high degree of rock weathering and dense cloud cover. Elsewhere in the poor countries, lack of geological surveys and transportation difficulties have slowed discovery and exploitation. In Indonesia, for example, only 67 per cent of the land area has been mapped systematically and only 36 per cent has been subjected to general mineral exploration. [17] The area of the continental shelf of Indonesia is equal to its entire land area, and very little of the shelf has been explored. Newly developed geochemical and oceanographic methods and remote sensing for geophysical anomalies from aeroplanes and helicopters, and more recently from satellites, are speeding up the rates of discovery. During the past few years, Indonesian exports of metals have been growing in value by nearly 18 per cent per annum. [18]

58. Several hundred thousand million tons of potato-sized manganese-iron concretions lie on the surface of the deep-sea floor, mostly at depths greater than 2,000 metres. They contain from 0.1 per cent to 1 per cent or more of copper, and equal or larger amounts of nickel and cobalt, as well as more than 25 per cent of manganese. The technology for large-scale recovery of these deposits, and for separating out the valuable metals, has become practical during the past few years; exploitation of this "common heritage of mankind" awaits only international agreement on mining rights and regulations. The currently proposed level of exploitation would have only a minor impact on world markets for copper and nickel, but future exploitation could be on such a large scale as to have a seriously adverse effect on several developing countries which depend upon copper and nickel exports for foreign exchange.

59. Future world mining activities are likely to have more destructive effects on the environment of human beings than in the past: first, because more metals will be mined; secondly, much mining will be done in tropical and subtropical regions of vulnerable ecology; and thirdly, as ore grades become lower, larger quantities of ore must be mined to obtain the same weight of metals. In Indonesia, strip-mining of residual deposits produced by weathering has left deep scars on the land. Hills disappear, rivers are dammed by mine residues and their courses are changed; the ground-water table is lowered; erosion is greatly increased; artificial ponds are created; and vegetation disappears. In some Indonesian islands where mining of sulphide ores was abandoned 40 years ago, no vegetation grows today, not even coconut-trees. Increased mining will also demand increased energy consumption, with all the attendant pollution. Sociologically, the introduction of mining into a previously agricultural region causes severe cultural shocks. Mining camps have a limited life; when the ore is worked out, the inhabitants are left with high unemployment and few resources.

Energy resources

60. It is universally recognized that the energy that sustains all living systems is derived from solar radiation. The total amount of solar energy fixed on the earth places a limit on the total amount of life; the pattern of flow of this energy through the earth's ecosystems sets additional limits on the kinds of life on earth. The solar radiation captured by the leaves of plants and stored as chemical energy becomes the essential biological energy source for the entire animal kingdom. It supplies, in particular, the energy required as food for the human population. During geological history, a small fraction of the organic matter of former plants and animals buried in sediments under condition

[17] Albert Ravenholt, "Man-land-productivity microdynamics in rural Bali", in Harrison Brown and others, eds., *Population: Perspective, 1973* (San Francisco, Calif., Freeman-Cooper, 1973).

[18] Economic Commission for Asia and the Far East, "Report of the Regional Seminar on the Ecological Implications of Rural and Urban Population Growth", Thailand, September 1971, pp. 30-44.

of incomplete oxidation has become the current source of supply of fossil fuels, coal, petroleum and natural gas.

61 Man has been said to have gradually acquired the knowledge to manipulate the energy stored in his biological and inorganic environment in such a way as to produce a continuous increase in total energy supply and a resulting increase in human population The use of energy has been a key to the supply of food, to physical comfort and to improving the quality of life The utilization of energy depends upon two factors: available resources; and the technological skill to convert the resources to useful heat and work. In the past, each new invention helped increase by a fraction the solar energy that could be used by man and the growth of population remained in balance with the increase in energy supply. The upsetting of the ecological balance in favour of human population occurred with the discovery of coal, about eight centuries ago and with the discovery of petroleum, just one century ago

62 Examination of energy consumption, in retrospect, indicates that there has been a steady improvement in the "efficiency" with which energy is converted to useful form In the United States of America, for example, it has been estimated that between 1900 and 1970, the efficiency with which fuels were consumed (for all purposes) increased by a factor of four Without this increase, the United States economy of 1971 would have been consuming energy at the rate projected for approximately the year 2025. Current power-plants operate at a thermal efficiency of from 30 to 40, a figure that may reach 50 by the year 2000 The thermal efficiency of the internal combustion engine, however, ranges from 10 to 25

63. Because of his lavish use of fossil fuels, the average farmer in the United States grows more than enough food for 50 other persons. The average Indian farmer, who depends upon his own muscles and those of his bullocks, is lucky to grow enough to feed himself and his family The costs of food production in the United States are about the same as those in India But the income of even the poorest farmer in the United States is several times that of the average Indian As long as he depends upon his own bodily energy, the Indian peasant cannot increase his income, because the calories and protein in the crops he produces are only about three times greater than his bodily expenditures. A man can produce in one day less than one kilowatt-hour of mechanical work; to keep him alive on the most meagre of diets costs at least 10 cents A kilowatt-hour of electrical power, or the equivalent in petrol, costs less than one cent.

64 Because energy from non-human sources is so fundamental, there is a close relationship between national energy consumption and national income The economic chasm that divides the world also separates two vastly different levels of energy use It has been estimated that in the developed countries, the average person uses the equivalent of 6 tons of coal per year [19] In the poor countries, the *per capita* use of energy averages less than four tenths of a ton per year. The enormous differences in incomes between the rich and poor countries cannot be ascribed to over-population in the poor countries, but rather to differences in the use of energy Eighty-seven per cent of the energy used in the world today is consumed by the rich countries, and only 13 per cent by all the rest of the world [20] These considerations raise several serious questions about the future Will it be possible, let alone desirable, to continue the use of energy at the present levels in the developed countries? Are these countries squandering the world's energy resources in such a way as to lead to a catastrophic decline of welfare for future generations? Will it be possible for the poor countries to attain a sufficient level of energy use to be able to lift themselves out of poverty and deprivation?

65 Table 4 shows the best current estimates of the energy reserves in each continent and a total for the earth as a whole Several salient facts stand out.

(*a*) Of the fossil fuels which are the principal current sources of energy, coal and lignite are by far the most abundant, comprising 86 per cent of all fossil fuels,

(*b*) If the use of nuclear power in breeder reactors could be safely developed, the available energy resources would be increased by at least a hundredfold and perhaps more than a thousandfold, at a fuel cost of only about 5 per cent of the current cost of coal,

(*c*) The total original reserves, including quantities already used, of petroleum, natural gas, and natural gas liquids, constitute only about 11 per cent of the reserves of fossil fuels More than half of this 11 per cent was originally present in the Middle East and the Soviet Union, and less than half in all other areas of the earth combined,

(*d*) About 85 per cent of the total reserves of coal and lignite are to be found in North America and the Soviet Union,

(*e*) The smallest quantities of fossil fuel reserves *per capita* are found in Africa, Asia and South America, the three continents which contain nearly all developing countries. Potential water-power resources are most abundant in these three continents, but the total is only about 4 per cent of world fossil fuel reserves and probably a negligible fraction of the reserves of nuclear fuel

66. Tables 5 and 6 indicate current and estimated future energy use up to the year 2000 It will be noted that in each continent a considerable amount of the total fossil fuel reserves would still be unused at that time. But the longest time horizon for reserves would be in the Soviet Union, with northern America and Africa also having several hundred years supply remaining. About

[19] J L Fisher and N Potter, *loc cit*

[20] M K Hubbert, "Energy resources", in National Academy of Sciences-National Research Council, *Resources and Man* (San Francisco, Calif, W H Freeman and Co, 1969), pp 157-242

TABLE 4. ENERGY RESERVES OF THE EARTH[a]

(Thousand millions of metric tons of coal equivalent)

	Crude oil	Natural gas liquids	Natural gas	Oil shales[b]	Tar-sands	Coal and lignite	Total fossil fuel	Water power[c]	Tidal power[d]	Uranium in non-breeder reactors[e]	Uranium in breeder reactors[f]
Africa	55	11	52	2		98	218	86		12	1,200
Asia (excluding USSR)	176	34	168	2		611	991	57		...	...
USSR	110	22	105	2		3,860	4,099	51	1.8	...	...
Europe (excluding USSR)	4	1	4	7		338	354	17	1.4	35	3,500
North America	65	13	62	18	66	1,880	2,104	34	3.2	100	10,000
South America	49	10	47	11		13	130	64	0.6	...	...
Australia and New Zealand						53	53	5		...	...
TOTAL	459	91	438	42	66	6,853	7,949	314	7	159[g]	15,900[h]

SOURCE: M. K. Hubbert, "Energy resources" in National Academy of Sciences-National Research Council, *Resources and Man* (San Francisco, Calif., W. H. Freeman and Co., 1969), pp. 157-242; by the same author, "The energy resources of the earth", *Scientific American*, September 1971, pp. 60-70.

[a] Original reserves, including quantities already used.

[b] Recoverable under current conditions. The total energy content in oil shales may be more than 100 times as great as the figures shown, but the possibility of economical recovery for fuel is doubtful.

[c] Assuming all potential water-power capacity is developed by damming streams, and the dams are usable, on average, for 100 years before filling up with sediment. The average annual rate of energy utilization would be about half the current rate from all energy sources.

[d] Assuming potential tidal sites are utilized for 100 years, the rate of energy utilization would correspond to 70 million tons of coal equivalent per year, about 1 per cent of current energy use.

[e] Uranium recoverable at less than $66 per kilogramme. Since less than 1 per cent of the uranium is utilized in a non-breeder reactor, this cost corresponds to about $2 per ton of coal equivalent.

[f] Uranium recoverable at less than $66 per kilogramme or about $2 per ton of coal equivalent. When and if breeder reactors are used as the principal source of nuclear-electric power, the uranium resources recoverable at less than $1 per ton of coal equivalent are hundreds or thousands of times greater than the figures given in the table.

[g] Includes 12 thousand million tons of coal equivalent in areas outside Africa, Europe and North America.

[h] Includes 1,200 thousand million tons of coal equivalent in areas outside Africa, Europe and North America.

TABLE 5. CURRENT AND ESTIMATED FUTURE ENERGY USE

	Population (millions)		Energy use (thousand million tons of coal equivalent)		Per capita tons of coal equivalent		Approximate years to depletion after 2000[a]
	1965	2000	1965	2000	1965	2000	
Africa	313	750	0.09	0.7	0.3	0.9	300
Asia (excluding USSR)	1,830	3,820	0.71	5.6	0.4	1.5	160
USSR	230	340	0.86	2.7	3.7	8.0	1,500
Europe (excluding USSR)	444	585	1.46	4.6	3.3	8.0	55
Northern America	213	310	2.04	6.4	10.0	20.0	300
Latin America	246	685	0.20	1.6	0.8	2.0	65
Australia and New Zealand	17	35	0.06	0.2	3.5	6.0	240
TOTAL	3,293	6,540	5.42	21.8	1.6	3.3	330

SOURCE: *Demographic Yearbook, 1969* (United Nations publication, Sales No. E/F.70.XIII.1); Joseph Fisher and Neal Potter, "Effects on resource adequacy and quality" in National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications* (Baltimore and London, Johns Hopkins Press, 1971), chap. 6, pp. 222-244.

[a] At rate of use in year 2000. Excluding hydropower or nuclear fission energy. For Africa, Asia and Latin America, rate of growth of total energy use is estimated at 6 per cent per annum. For Northern America, Europe and USSR, rate of growth is estimated at 3.25 per cent per annum.

half the reserves of crude oil and natural gas liquids will probably have been consumed by the end of this century, and more than a third of the natural gas reserves. However, only about 3 per cent of the reserves of coal and lignite will have been consumed. It is assumed in the tables that world energy consumption will quadruple between 1965 and the year 2000. Of this fourfold increase, half would be due to increased numbers of

TABLE 6 ESTIMATED AND PROJECTED WORLD USE OF FOSSIL FUELS, HYDROPOWER AND NUCLEAR FISSION ENERGY, 1870-2000

(Thousand millions of metric tons of coal equivalent per annum, except as indicated)

Year	Coal and lignite	Crude oil and natural gas liquids	Natural gas	Hydropower and nuclear fission	Total	Rate of increase (percentage per annum)	Calories per capita per day
1870	0 20				0 20	4 4	
1880	0 30	0 01			0 31	4 2	
1890	0 45	0 02			0 47	3 2	
1900	0 60	0 04	0 01		0 65	3 8	8,000
1910	0 85	0 07	0 02	0 01	0 95	2 0	
1920	0 95	0.16	0 03	0 01	1 15	3 2	
1930	1 05	0 30	0 06	0 02	1 43	3 0	17,000
1940	1 36	0 42	0 11	0 03	1 92	3.0	
1950	1 49	0 80	0 23	0 04	2 56	5 1	
1960	1 96	1 68	0 56	0 08	4 28	4 3	
1970	2 03	3 30	1 12	0 15	6 60	4 0	32,000
1980	2 10	5 35	2 20	0 25	9 90	3 9	
1990	2 70	7 00	4 40	0 50	14 60	4 0	
2000	5 65	8 15	7 00	1 00	21 80		64,000
						Average	
TOTAL x 10	217	273	157	21	668	*3 6*	
Original reserve	6,853	550	438		7,949		
Percentage depletion of original reserve	3	50	36		8		

Source: [illegible]

people, and half to the rise in *per capita* use At the current time, the average world *per capita* consumption of "man-made energy" is about 15 times the food energy consumed by human beings By the year 2000 it will be nearly 30 times. The most rapid relative increase in *per capita* use would occur in Africa, Asia and Latin America, with the European countries not far behind

67 As shown in table 5, there is a very wide range in *per capita* fuel reserves between different countries Several of the countries with the largest *per capita* reserves are highly developed socially and economically, others are generally included among the less developed countries. Some of the countries with the least reserves *per capita* also fall in each category. In the past few decades, there has been little relationship between the level of development of individual countries and the level of *per capita* fuel reserves because the highly developed fuel-poor countries have been able to rely on international trade to supply their fuel

68 Until 1973, fuel imports by the petroleum-poor countries constituted only a small fraction of their gross domestic product But if the current rise in the cost of petroleum and related fuels is sustained, many developed countries will face a very severe burden of foreign exchange over the next 30 years As indicated in table 7, in the case of Japan, the cost of imported fuel might be more than 9 per cent of the gross domestic product. If the United States continues to rely on petroleum and natural gas for most of its energy, it too will have a very heavy bill for fuel imports It is more likely, however, that the United States will turn to its own abundant coal reserves. Some currently developing countries, including Bangladesh, India, Pakistan, the Philippines and the Republic of Korea, could also have a heavy future burden of fuel imports India should be able to turn to its own coal reserves, but the other four countries would be hard-pressed

69 The figures shown in table 8 are very alarming for the near-term future of many developing countries The high bills for fuel imports which the developed countries may find it necessary to pay could greatly diminish already inadequate investments and capital transfers to the fuel-poor developing countries Even if fuel imports can be reduced by development of local energy sources, the capital investments required for this purpose would be likely to reduce the levels of investments and assistance by the rich countries to the poor ones For the intermediate term, however, the future is brighter. It can be calculated that if the world population reaches 10 thousand million people and the average *per capita* fuel consum tion popu-

lation rises to 5 tons of coal equivalent, about the same as in Europe today, the fossil fuel reserves would last for 200 years. If safe breeder reactors can be developed, the reserves of uranium would be sufficient for thousands of years. In the long run, humanity may need to come full circle by finding better means of capturing and converting the energy of the sun itself. All the energy of fossil fuels and of hydroelectric power came originally from the sun. Yet these currently used energy sources produce less than one twenty-thousandth of the energy of sunshine falling on the earth. Direct use of solar energy to heat water and to warm and cool houses is already practical, and space satellites are powered by the sun. But to learn to transform solar energy in the quantities required to meet the energy needs of future populations will call for an international research and engineering effort greater than any ever undertaken.

70. In brief, mankind can look forward, in the long run, to everlasting quantities of energy that is comparatively pollution-free, sunlight; in the fairly long run, hope can be placed on energy that is nearly inexhaustible and moderately clean, deuterium. In the short run, what is needed is energy that is readily usable and abundant. This may come from uranium and thorium, geothermal energy locked in the earth, or from coal, lignite and oil shales. But, as is shown in the next section, all these short-run energy sources have a high cost in environmental deterioration.

Population and environment

71. Historically, *homo sapiens* and his immediate ancestors were simply one among a number of competing predatory species living in a balanced, imperceptibly changing ecological matrix. Their survival depended upon a cunning understanding of the natural world, not upon the ability to change nature. But throughout the lifetime of the species, man has invented ways to modify and control the natural environment

Table 7. Estimated fossil fuel reserves, selected countries

Continent	*Greater than 1,000 tons per capita*	*Between 100 and 1,000 tons per capita*	*Less than 100 tons per capita*
Africa	Algeria Libyan Arab Republic South Africa	Nigeria Tunisia	Egypt Morocco United Republic of Tanzania Zaire Zambia
North America	Canada United States of America	Mexico	
South America	Ecuador Trinidad and Tobago Venezuela	Argentina Bolivia Chile Colombia Peru	Brazil
Asia	Bahrain Brunei Iran Iraq Kuwait Oman Qatar Saudia Arabia Trucial Oman	India Japan Pakistan Syrian Arab Republic	Afghanistan Burma Indonesia Philippines Republic of Korea Turkey
Europe and USSR	Czechoslovakia Germany, Federal Republic of German Democratic Republic Hungary USSR Yugoslavia	Bulgaria France Norway Poland Romania Spain United Kingdom	Denmark Italy Portugal Sweden
Oceania	Australia	New Zealand	

Source: *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XVII.1), tables 50, 51, 69 and 70. The United Nations reserve estimates for petroleum and natural gas have been multiplied by appropriate factors to allow for possible future discoveries.

TABLE 8 ESTIMATED COST OF FUEL IMPORTS IN PERCENTAGE OF GROSS DOMESTIC PRODUCT, 1970 AND 2000

Country	1970		2000	
	Cost of fuel imports (10⁹ dollars)	*Fraction of gross domestic product (percentage)*	*Possible cost of fuel imports (10⁹ dollars)*	*Fraction of estimated gross domestic product (percentage)*
Japan	4 85	2 4	67 2	9.3
Germany, Federal Republic of	2 45	1 3	38 7	6 5
United Kingdom	2 37	2 0	27 8	5 9
United States of America	3 99	0 4	306 6	8 6
Philippines	0 175	1 3	3 83	7 3
Republic of Korea	0 222	2.7	4 15	13 7
India	0 280	0 6	6 30	3 0
Pakistan and Bangladesh	0 103	0 6	3 15	3 9

SOUR[illegible] *book, 197*[illegible] ton of c[illegible] assumed [illegible] between gross domestic product and consumption of petroleum and natural gas and a tripling of fuel costs Estimated reserves of petroleum and natural gas in each country were taken into account

to suit his needs. During the past 10,000 years, these inventions have proceeded at an accelerating pace With the development of agriculture, the ecosystems of vast land areas were drastically altered and the genetic composition of many plants and animals was radically changed The invention of increasingly powerful tools made it possible to divert rivers and to alter the very shape and composition of the earth. Man learned to level hills and valleys to build his cities and roads; to win metals from ores in the earth to make his tools and weapons, to quarry rocks and to level forests for his structures. Within the past few centuries, he has learned to control many of the "pests", both seen and unseen, that formerly killed his children, destroyed his substance and shortened his own life With each step towards control of the natural environment, human numbers also increased Today, men have pre-empted the earth to an extent that could not have been dreamed of by their ancestors, and their numbers are rising at a rate never before experienced. Many people have begun to wonder whether these two processes have got out of control whether the inexorably growing numbers of people and their seemingly insatiable appetites are threatening the entire life-support system of the planet. It has been suggested that the numbers are already too large and mankind's demands too great to be sustained very far into the future. In so far as current knowledge extends, however, there is much evidence that human beings have the capacity to reduce the environmental consequences of their own actions to a tolerable level, and that this can be done by a feasible reallocation of resources

72. In the current divided condition of the world, humanity is faced with three sets of environmental problems: those which spring from poverty and inadequate social and economic development, those which arise during the process of development itself, and a third kind, little understood, poorly defined, and as yet of uncertain significance, which could lead to climatic changes over the entire planet Problems of the first kind affect mainly the people of the poor "developing" countries, the impact of the second is felt in both the rich "developed" countries and in the poor ones as they develop, the third could affect all mankind. Population processes or urbanization, levels and patterns of consumption, and technological change are causes of all three sets of problems, but their relative importance differs.

73. In the rich countries, the most serious environmental problems have emerged within the past 30 years They are caused primarily by high levels of energy use, and by the necessity to dispose of wastes produced by high material consumption Their severity and character have been exacerbated by technological change The effects of environmental deterioration on health and well-being are relatively small for most people and the material costs, both of environmental deterioration and the measures to remedy it, are relatively small compared to national incomes, even though these costs can be measured in thousands of millions of dollars The environmental problems of the rich countries are the problems of affluence.

74. Both rapid population growth and urbanization are important causes of environmental deterioration in the poor countries. Even more important is widespread, persistent, grinding poverty. Many of the problems have existed for centuries, though others are newly arisen. Some are caused by the necessity of increasing agricultural production to feed rapidly growing populations; others by the widespread unemployment under-

employment in rural areas which force the poor and the dispossessed into the cities. The environmental problems of the poor countries are not simply matters of discomfort or loss of amenities, but quite literally matters of life and death. In contrast to the rich countries, where the will and the means to solve environmental problems are rapidly growing, environmental remedies in the poor countries are inhibited by institutional inadequacies and by a scarcity of resources.

75. In both the rich and poor countries, the impact of environmental deterioration falls on individual human beings.[21] While this impact is much greater for some socio-economic groups than for others and is different for different kinds of environmental deterioration, it is possible to think of an average impact for the average person in a particular geographical region. The total impact is then simply this average multiplied by the number of persons, the population of the region.[22] Hence, in both the rich and poor countries the impact of environmental deterioration depends upon population size and distribution, and the rate of increase of this impact is determined by the rates of population growth and urbanization.

Environmental deterioration in the developed countries

76. In thinking about the rich countries, some writers have argued that the amount of environmental disruption can be expressed as the product of three factors: *population times consumption per person times* damage per unit of consumption (this damage is related to the technology of production or consumption). These writers take the rate of increase in environmental disruption in a given area as the product of the rates of increase of the population of the area, the level of consumption per person and the environmentally disruptive effect of technological change. The equations rest implicitly on the assumption that economic growth is significantly determined by population growth—in other words, that growth in gross national product would be smaller if the rate of population growth were lower. In the modern industrialized countries, there is little empirical evidence or theoretical justification for such a relationship. Between 1958 and 1965, the gross national product, at constant prices, of Japan, Hungary and the Federal Republic of Germany increased at annual rates of 14, 7 and 6.5 per cent, respectively, while their populations grew at 1.0, 0.4 and 1.3 per cent per annum.[23] The gross national product at constant prices of Canada and the United States grew at only 4.3 and 3.4 per cent per annum, even though their rates of population increase were 2.0 and 1.5 per cent. In the production functions commonly used by economists to describe economic growth, capital and labour are largely substitutable for each other and both are swamped by other terms referring to technological innovation, "quality" of the labour force and character of industrial and governmental institutions. According to Kuznets, no more than 10 per cent of the economic growth rate in a number of European countries, Australia and Japan can be accounted for by a "direct contribution of man hours and capital accumulation".[24]

77. About 70 per cent of the populations of developed countries live in cities and towns. Pollution is largely a sickness of the cities, in terms of quantity of pollutants, level of environmental deterioration and impact on people. This is also true of some other aspects of poor environmental quality, including traffic congestion, unhealthy slum housing and hazardous living conditions. However, some forms of environmental decay, for example, extermination or endangering of plant and animal species, crowding of parks and recreational areas and oil pollution on beaches, cannot be blamed on cities. Similarly, eutrophication and contamination of lakes, estuaries and other water bodies are often caused by agricultural waste products. Most of these ills derive mainly from growing affluence and environmentally destructive technology. Changes in technology are also largely responsible for the growth of metropolitan populations and the corresponding emptying of rural areas during the past few decades.

78. The environmental effect of increasing gross regional or national product undoubtedly varies somewhat with population size. For example, although the number of motor-cars could conceivably increase without limit, the number being driven at any one time, and hence the number of sources of pollutant emissions, can never exceed the number of drivers. As Ridker[25] has shown, these effects are small. Using a model in which both capital investment and size of the labour force are among the determinants of economic growth, Ridker calculated the size of GNP in the United States for the next 50 years under two different assumptions about rates of population increase, one in which the average completed family size was two children and another with an average of three children. He also used two different sets of assumptions about other factors affecting economic growth; one of these gave a high rate of growth and the other a significantly lower rate. Under either set of assumptions, the estimated future GNP increases somewhat more rapidly with a higher rate of population growth, by about 10 per cent during the next 30 years and by nearly 25 per cent in the year 2020. But the quantity of pollutant emissions

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[21] This concept and the following section were based largely on analyses by Harold A. Thomas, Jr., of Harvard University.

[22] For example, the United States Atomic Energy Commission estimates the magnitude of total risk from nuclear reaction accidents as the product of the number of reactors within a given area, times the number of people living or working in that area, times the probability of an accident to a single reactor.

[23] Roger Revelle and Hans H. Landsberg, eds., *America's Changing Environment* (Boston, Mass., Beacon Press, 1970), pp. ix-xxxvii.

[24] Simon Kuznets, *Modern Economic Growth* (New Haven, Yale University Press, 1966), pp. 80-81.

[25] Ronald G. Ridker, ed., *Population, Resources and the Environment*, vol. III of Research Reports of the Commission on Population Growth and the American Future (Washington, D.C., Government Printing Office, 1972).

varies directly with GNP. For example, with a difference of 35 per cent in GNP, between 1,900 thousand million and 2,600 thousand million dollars in the year 2000, the level of hydrocarbon emissions varies by about 25 per cent, while the quantity of suspended solids emitted to waste waters varies by roughly 35 per cent Ridker's analysis shows that the level of pollution abatement is far more important than the effects of increasing GNP Even using currently available abatement technology and standards that will be enforced within the next few years, the total emissions to the environment in the year 2000 would be from one third to one eighth of the emissions in 1970. A head-on attack on environmental problems would be much more effective than attempts to reduce economic or population growth.

79 Singer,[26] also using a neo-classical economic model, has computed a "welfare index" for the United States, using four different rates of population growth with current trends of investment, labour productivity, discretionary leisure time, geographical distribution of population and distribution of labour sectors His "welfare index" is essentially a measure of *per capita* household consumption which takes account of certain "bads" produced by economic and urban growth—pollution control costs, costs of recovery of natural resources, and traffic congestion and other disamenities of large cities Such "regrettable necessities" as defence and police expenditures and commuting to work are also subtracted. Under his assumptions, the population of the United States would be 40 per cent higher and the GNP about 20 per cent higher in the year 2020 for a rapid rate of population growth than it would be if the age-specific fertility in 1971 were maintained Hence *per capita* incomes would be 20 per cent lower. The "welfare index" would be approximately 30 per cent lower. Even with high population growth, however, the calculated "welfare index" would be nearly twice what it was in 1970. The value of the "welfare index" depends critically upon the assumed costs assigned to the "bads" produced by economic and urban growth and the expenditures categorized as "regrettable necessities", as all of these are subtracted from incomes

80 Singer assumes that the gross national product increases with the size of the labour force, but that the effect of labour-force growth on the rate of growth of GNP is much smaller than the rate of growth of the labour force—in other words, *per capita* incomes increase relatively slowly if the population grows relatively rapidly. As has been seen, there is little evidence in developed countries for a direct relationship between changes in labour force or population size and changes in GNP, although it is obvious that, with any given rate of growth of GNP, *per capita* incomes will grow more slowly if the population also grows. Moreover, propensity to save, rate of introduction of technical innovation, composition of government expenditures and other factors affecting changes in *per capita* income may be adversely affected by population growth. Since growth in *per capita* income is the principal determinant of the level of expenditures on abatement of environmental deterioration, the net deterioration (after abatement) would be smaller if population growth rates were lower

81 Calculations by H A Thomas, Jr, show that, in the United States of America, the proportion[27] abated for some important kinds of pollutants has increased by 6 per cent per year over the past half a century, much faster than the rate of growth of GNP If this rate of increase in the level of abatement continues and can be extended to cover the entire range of pollutants, environmental deterioration in the developed countries may prove to be a transitory phenomenon Future generations may wonder at the intensity of the current environmental concerns.

Energy use is the principal source of environmental disruption in the rich countries

82 Most environmental deterioration in the developed countries is related to the use of energy, and these relationships are an informative example of the complexities involved in environmental problems. Cross-sectional comparisons of different developed countries show that, on average, their total energy use varies directly with their gross national products. Similarly, over the past 50 years in the United States, the rate of increase of energy consumption has been about 3 6 per cent per year, very close to the average rate of growth of gross national product Recovery and use of energy from coal, oil and radio-active materials causes environmental disruption at every stage, from mining, through processing, transportation and conversion, to disposal of waste heat Even hydropower is environmentally destructive

Mining

83 Oxidation and leaching of the sulphides contained on coal deposits cause the drainage water from many coal mines to be highly acidic, and these acid waters pollute springs, streams and wells Strip-mining of coal—scraping off the overburden of soil and rock and digging out the coal with powerful shovels—avoids traditional mining, but leaves ugly scars on the landscape. These are especially hard to cure in arid and semi-arid lands and other regions of vulnerable ecology. Uranium mining is hazardous to the health of the miners, and the tailings, which have been used as construction materials, present a radio-active hazard to the public at large Dams and man-made lakes for hydropower drown fertile bottom lands, destroy aesthetic values and result in down-stream erosion because of the settling of river silt behind the dams Extensive damage is done to beaches, recreational area and

[26] S Fred Singer, "The environmental implication of zero population growth", unpublished manuscript, 1973

[27] This ratio gives the level of expenditure on pollution abatement in relation to the expenditures needed to reduce pollution by 50 per cent

harbours by oil pollution from off-shore drilling and production of petroleum.

Transport

84. Oil spills resulting from accidents to large tankers deservedly attract much public attention. The danger of large-scale accidents is increasing with the increasing size of tankers. These enormous ships have so much draught and inertia, and are so difficult to handle that a stranding or collision is more likely to result in a destructive wreck than with smaller ships. A loss of one of the new large tankers under conditions where it would be impossible to off-load the oil would add about 20 per cent to the amount of petroleum entering the oceans in a single year. One distinguishing characteristic of the problem of oil pollution by ships is that while most of the obvious damage occurs in waters and coastal areas under national jurisdiction, international agreements and control measures are needed to reduce or eliminate the causes of the pollution. Current international agreements to control oil pollution are inadequate, because they lack effective means of enforcement. Such agreements should include provisions for easily and uniformly applied sanctions which would ensure that the costs to polluters shall be greater than the benefits they receive and shall be sufficient to pay for cleaning up the pollution and repairing the damage.

85. Perhaps a quarter of total oil pollution from ships and land sources occurs in semi-enclosed seas, such as the Mediterranean, the Black and North Seas, the Persian Gulf and the Gulf of Mexico, which have a total area of slightly over 2 per cent of the ocean. Because of the very slow rate of oxidation of oil in cold ocean waters, the future development of oil production in the Alaskan North Slope, the Canadian Archipelago and off Siberia may produce serious contamination in the Arctic Ocean, if adequate safeguards and pollution control measures are not employed. Regional and international agreements may be the most effective way to deal with the concentration of pollution in such semi-enclosed seas.

Energy conversion

86. A problem with all fossil fuels is that they contain sulphur, since they are largely formed from the remains of plants and sulphur is an essential element in plants. Further, they were formed under reducing chemical conditions, which produced hydrogen sulphide from the dissolved sulphate in sea and swamp waters. The hydrogen sulphide has left various kinds of sulphides and sulphates. The burning of sulphur-containing coal and oil by manufacturing and electric power-plants releases sulphur oxides into the air. About 10 million tons of these oxides were spewed into the atmosphere in the United States in 1965. The cost of the air pollution produced by sulphur oxides and the accompanying soot, in terms of cleaning bills, decay of building stones and statues, destruction of fabrics, rubber tyres and other materials, and removing soot from blackened buildings, can be measured in thousands of millions of dollars. Whenever sulphur oxides build up in the air and persist for several days, there is likely to be an incident of acute air pollution in which literally thousands of people die, even though the chief problem of sulphate pollution is not acute episodes, but chronic low levels which can have serious effects on human respiratory systems.

87. Any fuel combustion using atmospheric oxygen at temperatures above 1,400°C will result in the combination of atmospheric nitrogen and oxygen to form oxides. Large quantities of these oxides are emitted by most modern motor-cars. At the same time, from 5 to 10 per cent of the hydrocarbon fuel used in those vehicles is not oxidized, and is emitted from the exhaust or evaporates from the carburetor and the crank case. Under the action of sunlight, the unburned fuel and the nitrogen oxides combine to form ozone and a great variety of eye and throat irritants and plant-damaging compounds. This is the so-called photochemical smog. Carbon monoxide is produced from incomplete combustion (about three pounds per gallon of petrol in most motor-cars). This substance is deadly poisonous at high concentration, but the concentration levels on most roads and expressways have few easily detected effects.

88. New forms of energy will have to be substituted eventually for fossil fuels. These are generally thought to be the atomic sources of energy, which produce radio-active pollutants. No really safe methods of disposal of radio-active wastes have yet been invented; no one has devised a fail-safe method of safeguarding the plutonium produced in nuclear reactors; and the reactors themselves are likely to have an accident which will melt the radio-active fuel and spill it over the landscape. All three of these problems must be solved if atomic energy from nuclear fission is going to be substituted on a large scale for coal and oil.

Waste heat

89. Less than half the energy converted or "used" in developed countries goes to useful work. The remainder becomes "waste heat". While much of this heat, principally that produced in transportation, and space-heating and air-conditioning, is vented directly to the atmosphere, about 70 per cent of the thermal energy used for electric-power generation (in the United States, energy for electric power equals 26 per cent of total energy consumption) ends up in hot water or low-temperature steam and must be disposed of either in rivers, lakes, estuaries and the ocean, or in cooling-towers, where part of the cooling-water evaporates in the air. Disposal in rivers and smaller water bodies causes severe problems of thermal pollution. The temperature of many rivers is raised as much as 10°C and sometimes even more. This can cause a profound disturbance of the aquatic ecosystem. Aquatic organisms commonly have a narrow temperature range. When the temperature of the water changes, these organ-

isms are killed or weakened, and others move in to take their places

Reduction in environmental deterioration from energy use

90. Several lines of action can be followed to reduce environmental deterioration resulting from the use of energy, including (*a*) reduction of total energy use; (*b*) introduction of non-polluting energy converters; (*c*) removal of noxious substances before they enter the environment; and (*d*) substitution of non-polluting energy sources for those that pollute

91. One measure to reduce energy use would be to increase the efficiency of electric-power generation Currently, an average of 30 per cent of the thermal energy in fossil fuels is converted into electricity, and about 70 per cent is transferred to the environment as waste heat The efficiency could be raised to between 50 and 60 per cent by a suitable combination of magneto-hydrodynamic and turbine generation Smaller motor-cars with less energy consumption per passenger-mile and the substitution of mass transit for private motor-cars in cities could reduce energy use in the United States by at least 12 per cent Large savings in the use of energy for space-heating and cooling could be obtained by better insulation of buildings Improved kinds of motor-car engines which produce fewer nitrogen oxides and unburned hydrocarbons would be an example of environmental improvement through better means of energy conversion.

92. The problems of pollution from combustion processes would be solved by substituting other sources of energy for fossil fuels, although these other sources—e g, nuclear fission, hydropower and geothermal power—have more or less their own sets of environmental problems

93. The impact of energy pollution would be lowered by relocating large stationary energy converters such as electric-power plants away from the cities, for example in the so-called "mine-mouth power plants" near the source of the fossil fuel. The impact of waste heat could be lessened by applying it to beneficial uses In Japan, warm cooling-waters used in irrigation allow a longer growing season for rice and other crops, and beneficial ecological changes can be produced in some ocean areas by careful disposal of waste heat in them

Factors determining environmental deterioration in developing countries

94 In the developing countries, population size must be taken into account directly in evaluating environmental deterioration, in addition to gross production, urbanization and the effects of technology. Changes in both production and consumption and their effects on the environment are strongly influenced by the growth of population

95. The findings of a multiple regression analysis, seeking for an explanation of variation of organic wastes at Seoul, Republic of Korea, in terms of those variables which best serve to predict observed data indicated that population density and income are important and that the former is the more significant. This results from the fact that the weight of organic waste produced by human beings does not vary markedly with their incomes. It should also be noted that the area of the city is not constant, but increases with the city's population, though usually at a slower rate.

96. Rapid population growth in the poor countries directly influences environmental deterioration in a number of ways, as follows:

(*a*) The intense efforts of the rural population to raise food production to feed their own rapidly growing numbers often result in attempts at cultivation of previously marginal lands, speeding up of the cycle of swidden (slash and burn) agriculture, destruction of forests, salt accumulation in the soil due to the dispersal of inadequate supplies of irrigation water over larger and larger areas and over-grazing of pasture lands [28] The common consequences are disastrous erosion and soil deterioration,

(*b*) Population growth is one of the principal causes of the very high rates of concentration of people in the cities In the poor countries, urban growth is caused by natural increase—the large excess of births over deaths in the cities—and by immigration from rural areas The latter is due in part to lack of rural employment opportunities for the rapidly increasing numbers of young people entering the labour force, and in part is related to differentials in *per capita* income between the city and the countryside In developing countries there is a high degree of correlation between the percentage of the population living in cities and towns and the *per capita* gross domestic product of the country. However, in the poorer developing countries, only a slight increase in *per capita* product corresponds to a large increase in urban population, which is equal to the product of the change in percentage urban population times the growth of the total population Hence, the crowding of people into cities proceeds more rapidly than the ability of the city dwellers to make the increasingly high *per capita* expenditures in urban infrastructure needed to protect themselves from the environmental hazards caused by their own growth in numbers

[28] [illegible] the c[illegible] *ceedi*[illegible] *trol*[illegible] cultu[illegible] *la T*[illegible] *et au Maroc) — Recherches physionomiques, ecologiques et dynamiques* (Tunis, Institut national de la recherche agronomique, 1969); William L Thomas, Jr, ed, *Man's Role in Changing the Face of the Earth* (Chicago, Illinois, University of Chicago Press, 1956); Daniel Janzen, "The unexploited tropics", *Bulletin of the Ecological Society of America*, September 1970, pp 4-7, Mary McNeil, "Lateritic soils in district tropical environments southern Sudan and Brazil", in [illegible] Bali", *loc. cit*

Empirical data relating to 18 countries of the region of the Economic Commission for Asia and the Far East (ECAFE) indicate that for a 3 per cent rate of population growth and an initial gross product of about $70 *per capita*, the urban population will increase fourfold in 20 years if the gross domestic product *per capita* increases to about $110. Even counting the differential between urban and rural *per capita* incomes the average urban income may be too low to allow for adequate investments in housing, water-supply, waste disposal and other urban infrastructures;

(*c*) The concentration of human beings in the cities, particularly in high-density urban slums and squatter settlements with inadequate water-supply or waste-disposal systems, raises the rate of production of highly infectious human wastes beyond the capacity of the soil and natural drains to absorb them;

(*d*) In the poorer sections of the city, the dangers of infection from water-borne diseases are increased because more people use the same common water sources;

(*e*) As the city grows in area, the ratio of perimeter to area decreases and the transport distances for waste increase. Both these effects increase the difficulty of waste disposal;

(*f*) The quantity of water available for domestic use in rural areas is often limited. Increasing water needs, caused by population growth, may approach or exceed the limit of available supply, with the results that personal hygiene and sanitation deteriorate and diseases multiply;

(*g*) Continuing poverty, resulting in part from high-dependency burdens and the excess numbers of people over work opportunities, delays and may even prevent investments in improved water-supplies and waste treatment, and other measures of environmental amelioration. Both the urban and rural poor are caught in a low-income environmental trap.

97. Current conditions in one African city have been described as follows:

> "By 1963, Lagos had burst through the confines of its municipal boundaries and like rapidly industrializing cities everywhere in the world was engulfing neighbouring small communities in a dramatic 'metropolitan explosion'... Their combined populations had increased from about 60,000 in 1952 to nearly half a million in 1963 [bringing] the total population of the continuous built-up area to well over a million... District councils formerly concerned with overseeing the needs of predominantly rural communities became suddenly faced with the entirely different problem of a restless urban group ... Within a short time, the tolerable rural conditions are changed to the menacing squalor of an urban slum ... access to many houses is by narrow footpaths which also serve as drains for household water... less than 35 per cent [of houses] have piped water and less than 70 per cent have electricity. In 40 per cent pit latrines are in use ... There are no regulations as to density of houses, design and quality or even a minimum level of convenience in the houses, all of this makes the slum really squalid and unhealthy." [29]

98. According to Correa, [30] the majority of families in Bombay live in housing units with an average area of 6 m^2 or about 1.2 m^2 per person. In western Europe and North America, the estimated housing space per person is about 30 m^2. Correa recommends an average of about 6 m^2 per person as a planning guide for the "New Bombay".

The problem of water-supplies and waste disposal

99. Probably the majority of the people in the developing countries use domestic water from sources that are subject to contamination. The growth of population in rural areas probably now exceeds the water supply. The water-supply in these areas deteriorates rather than improves as population increases. In Latin America, only about 34 per cent of households have piped water, ranging from 11 per cent in Paraguay and 21 per cent in Brazil to 62 per cent and 68 per cent in Chile and Costa Rica. Safe drinking-water is available to less than 10 per cent of the Indian villages. In many villages, water-supplies are scanty and accessibility is difficult; in others, the wells are contaminated with human wastes. In the cities and towns, the water, as it enters the city's distribution system, is chemically treated and safe for human use; but the hydraulic pressure may be so low that the water can become contaminated with sewage before it reaches individual households. In urban slums, the distribution system is often rudimentary. In East Africa, a large proportion of rural people have to walk long distances to draw their water from rivers, streams and unprotected springs which have faecal coliform counts of from 20 to 8,000 per 100 millilitres. [31] Others use "protected" springs and dug wells which are still faecally contaminated, but at lower levels. Nevertheless, the danger of widespread infection from human wastes is greater in the sections of high population density in the cities, because of the large numbers of people using relatively few water sources. In the countryside, the quantity of moderately clean water is often inadequate, making personal hygiene and sanitation difficult, which in turn results in widespread gastro-enteric, skin and eye infections. In the cities, the hazard of infection from dangerous supplies of drinking-water is more serious than the problems of adequate volume. Both the rural and the urban problems increase directly with population growth.

100. Waste-disposal problems are also becoming intensified in the rural areas of developing countries,

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[29] A. L. Mabogunje, *Urbanization in Nigeria* (New York, African Publishing Corporation, 1968), pp. 235 and 270.

[30] Charles Correa, "Self-help city: the internal organization of metropolitan areas", *Population Debate*, vol. II, part five.

[31] Gilbert F. White, David J. Bradley and Anne U. White, *Drawers of Water, Domestic Water Use in East Africa* (Chicago, Illinois, University of Chicago Press, 1972).

because of rising man-land ratios, growing use of pesticides and chemical fertilizers, and increasing consumptive use of surface waters for irrigation, which impairs the quality and reduces the quantity of water remaining for other uses In five villages from widely separated parts of India, it was found that from 23 to 75 per cent of the people were infected with round-worms, hook-worms, pin-worms, dwarf tapeworms and intestinal amoebas [32] Many villagers are sick a good deal of the time They are unable to absorb all the food they eat because of the damage done by parasites to the intestinal membranes and because part of their food goes to feed the worms and protozoa that infest their intestines Their potential productivity is lowered by illness and debility, and the children are unable, because of illness, to respond as well as they might to education Baker and Mathan [33] compared sugar absorption and fat excretion in average inhabitants of the United States and a group of Indian villagers. The villagers were able to absorb between 10 and 20 per cent less of the sugars and fats they ate than the average dweller in the United States.

101 Infectious diseases related to water have been classified in four groups, depending upon the ways in which their incidence or severity can be reduced by improvements in water-supply (see also table 9)

(1) "Water-borne" diseases are those in which the infectious agent is alive in drinking-water Their incidence and severity can be reduced by purifying the water In the "classic" water-borne diseases, such as typhoid, a relatively low concentration of the infectious agent introduced by a few people can infect most of the others who use that water-supply In "non-classical" water-borne diseases, e g , paratyphoid and "gastro-enteritis", a relatively high concentration of the infectious agent may be necessary to spread infection;

(2) "Water-washed" diseases are those in which the incidence or severity can be reduced by augmenting water quantity These include infections of the outer body-surfaces, such as trachoma, skin ulcers, scabies and typhus; and others which affect the intestines, including bacillary and amoebic dysentery and "gastro-enteritis";

(3) "Water-based" infections are those in which the disease agent spends part of its life cycle in water. The infection occurs when the skin is in contact with the water or through drinking-water. Schistosomiasis and Guinea worm are examples;

(4) Several insect-carried diseases are related to water, either because, as in the case of mosquitoes, the larvae are aquatic, or, as in the case of Gambian sleeping-sickness, the species of tse-tse fly which carries the disease lives near water-holes in semi-arid regions These diseases are called "water-breeding" or "water-proximity" [34]

102 The incidence of nearly all water-related diseases can be reduced by improvements in the quantity or quality of water-supply White and his colleagues have made estimates of the likely percentage of reduction These authors estimate that the capital costs of needed improvements in East Africa would vary from $3 to $15 *per capita* [35] Actual expenditures in Kenya in 1964 were not much more than two cents *per capita* in rural areas and about $2 *per capita* in the cities Most of the urban investment was spent to provide a relatively elaborate water distribution system for the high- and middle-income city dwellers, and very little for the densely crowded poorer districts of the cities. In 1969-1970, an investment of about 28 cents *per capita* was scheduled for water-supplies for the entire country At this level of expenditure, the proportion of the rural population served by water-supply schemes would be smaller in 1971 than in 1965.

103 Bangkok, the leading metropolis of Thailand, grew from a population of 500,000 in 1940 to about 3 million in 1972 [36] Over 20 per cent of the population do not have proper housing In one community, 25,000 persons live in an area of 1 3 km² Only 3 per cent of the households in this community have piped water, and one third have toilets Although Bangkok suffers from serious air pollution, poor drainage facilities which result in flooding during the monsoon and some of the worst traffic congestion in the world, water-supplies, as described in paragraph 25, are potentially its most serious environmental problem.

104 The problem of water quantity is being solved for the time being by construction of an up-stream dam to augment the low flow A better solution would be construction of tube-wells in the agricultural areas which could be used instead of the river as a source of irrigation water during the dry season The aquifers supplying these tube wells would be recharged during the monsoon The increased availability of water from the Chao Phraya river for the city would then make it possible to reduce, or even eliminate, pumping from the wells under Bangkok But the problem of water quality would remain

105 In Asian cities, the traditional water-carriage sewerage system used in developed countries may be inappropriate, because of its high costs. At Seoul, for example, and even in Tokyo, the major part of the human wastes is collected by trucks and stored in large tanks throughout the city. The problems of safe ultimate disposal of these highly infectious stored materials have not been satisfactorily solved Like the Chao Phraya, the

[32] K P Krishnamoorthi, M K Abdulappa and A. K. Anwikar, "Intestinal parasitic infections associated with sewage farm workers with special reference to helminths and protozoa", *Proceedings of a Symposium on Environmental Pollution*, 1966, pp 80 81

[33] S J Baker and V I Mathan, "Tropical enteropathy and tropical sprue", *American Journal of Clinical Nutrition*, vol 25, No 10 (October 1972), pp 1047-1055

[34] G F White, D J Bradley and A V. White, *op cit*

[35] *Ibid*

[36] Sidney Goldstein, *The Demography of Bangkok A Case Study of Differentials between Big Cities and Rural Populations*, research report No 7 (Bangkok, Institute of Population Studies, Chulalongkorn University, 1972)

TABLE 9. RELATION BETWEEN WATER SUPPLIES AND INFECTIOUS DISEASES IN EAST AFRICA

(1) Disease category [a]	(2) Name [b]	(3) Incidence (frequency) [c]	(4) Severity	(5) Chronicity	(6) Infection route or relation to water [d]	(7) Type of water-supply improvement needed to reduce incidence [e]	(8) Percentage reduction if water-supply is sufficiently improved
"Classical" water-borne	Cholera	(++)	+++		D	P	90
	Typhoid	+	+++		D	P	80
	Leptospirosis	r			D,B	P	80
	Bacillary dysentery	++	+++		D	P,V	50
	Amoebic dysentery	+	++	++	D	P,V	50
"Non-classical" water-borne	Paratyphoid	r			D	P,V	40
	Infectious hepatitis	++	++	+	D	P	10?
	Enteroviruses	++			D	P,V	10?
	"Gastro-enteritis"	+++	+++		D	P,V	50
Water-washed skin	Skin sepsis	+++	+	+	S	V	50
	Skin ulcer (chronic)	+++	+	++	S	V	40
	Trachoma	+++	++	++	S	V	60
	Eye inflammation	+++	+	+	S	V	70
	Scabies	++	+	+	S	V	80
	Yaws	+	++	+	S	V	70
	Leprosy	++	++	++	S	V	50
	Tinea	+	+		S	V	50
	Otitis externa	r			S	V	40
	Typhus	r	+++		S	V	40
	Relapsing fever	r	+++		S	V	40
	Ascariasis	++	++		S	V	40
Water-washed diarrhoeal	Bacillary dysentery	++	+++		D	P,V	50
	Amoebic dysentery	+	++	++	D	P,V	50
	"Gastro-enteritis"	+++	+++		D	P,V	50
Water-based percutaneous	Urinary schistosomiasis	++	++	++	B	P	80
	Rectal schistosomiasis	++	++	++	B	P	40
Water-based oral	Guinea worm	(++)	++	++	D	P	100
Water-breeding insect vectors	Yellow fever	r	+++		I	C	10?
	Onchocerciasis ("river blindness")	++	++	++	I	C	20?
	Malaria	+++	++	+	I	C	10?
Water-proximity insect vectors	Gambian sleeping-sickness	+	+++	++	I	C	80

SOURCE: Gilbert F. White, David J. Bradley, Anne U. White, *Drawers of Water, Domestic Water Use in East Africa* (Chicago, University of Chicago Press, 1972), pp. 151-217.

[a] See text for a fuller description of the eight disease categories.

[b] Names of diseases are those used in East African hospital records.

[c] Indicators of incidence refer to East Africa, except for cholera and guinea worm, where a global frequency is used; these diseases are rare in East Africa. The greater the number of crosses, the more common the disease; those labelled "r" are rare or at least infrequently diagnosed.

[d] D = infection from drinking contaminated water;
B = infection from contact with contaminated water;
S = much greater incidence where quantity of water available is small;
I = infection transmitted by insect vectors;

[e] P = improvement in water quality resulting in absence or low concentration of infectious organisms;
V = increase in volume of available water-supplies to permit better personal hygiene;
C = drainage, clearing, spraying and provision of new water-supply sources to reduce contact between human beings and infected insects.

Han River, which flows through Seoul, is dangerously polluted. If waste-disposal problems of the rapidly growing, densely crowded, poverty-stricken cities of the developing countries of Asia, Africa and Latin America are to be solved, new and ingenious engineering innovations are called for. These may often need to be tailored to the situation of a particular city.

106. Besides the effects of population change on the environment in developing countries, changes in the environment may influence demographic parameters, though these inverse effects are not well understood. The relative levels of environmental quality in rural and urban areas are one of the factors determining rural-urban migration. Urban women in Thailand have fewer children than rural women, and women in the primary city of Bangkok have fewest of all. Urban death rates in Bangkok are likewise only about 55 per cent of

death rates in the rural areas.[37] Employment on public works for environmental betterment will reduce unemployment and improve income distribution, possibly with beneficial effects on both mortality and fertility. Better sanitation will lead to reductions in mortality, especially of infants and children, and this may encourage lower fertility.

Benefits from environmental improvement

107. Besides the improvements in the peoples' health from control of infectious disease, four other social and economic benefits would result from government action for environmental betterment in the poor countries:

(1) Employment of large numbers of poor people in public works projects;

(2) Reduction of food requirements and costs by lessening the malabsorption caused by intestinal parasites. This might ultimately save $2 thousand million per annum in India alone. This annual saving would be about equal to the entire capital cost of needed water-supply improvement in all of rural India;

(3) Increases in potential economic productivity through improved health of adults;

(4) Greater receptivity of children at the early ages by improvements in health.

Global environmental change

108 Human activities have global environmental effects which could result in significant climatic change Although such dramatic events as a new ice-age or the melting of ice caps may be unlikely, smaller changes can be easily visualized—for example, an expansion or latitudinal shift in the arid and semi-arid zones. These could have disastrous consequences for agriculture in many countries. During the next 30 or 40 years, climatic change might be brought about by human beings in several ways, of which the most important probably are. (*a*) addition of carbon dioxide to the atmosphere from the burning of coal, oil and natural gas, (*b*) increases in the turbidity or "dustiness" of the atmosphere resulting from industrial growth, and (*c*) the uneven distribution of heat produced by human use of energy. More than 85 per cent of the carbon dioxide and the heat are generated in the industrialized countries and they probably produce a good deal more than half of the particles entering the air.

Carbon dioxide from combustion of fossil fuels

109. Coal, oil and natural gas are used by man in larger quantities than any other substances except water and air. These "fossil fuels" originated during the past 500 million years from the chemical transformation, deep beneath the earth's surface, of the remains of plants and animals that were produced originally by photosynthesis from carbon dioxide and water. By bringing fossil fuels to the surface and burning them, human beings are simply returning the carbon and oxygen to their original state Within a few short gener ations, mankind is consuming materials that wer formed and concentrated over geological eras. If all th recoverable coal, oil and natural gas were burned about 10 times the current carbon dioxide conter would be added to the atmosphere Probably half c this would become dissolved in the ocean almost a rapidly as it is added; in a few hundred years, most c the remainder would be deposited as calcium carbonat and organic matter on the ocean floor But in the mean time, the additional carbon dioxide would have a signifi cant effect on the earth's climate.

110. The molecules of carbon dioxide absorb th invisible infra-red radiation from the earth's surfac and reradiate it downward as well as upward. The have little effect on the visible wave lengths of sunlight Molecules of water vapour in the air behave in a simila fashion Thus, both water vapour and carbon dioxid can be thought of as acting like the glass in a green house The glass is transparent to visible light and it i relatively opaque to the longer infra-red wave lengths In order to maintain a balance of incoming and out going energy, the temperature inside the greenhous must be warmer than it would be if the glass were no present The higher temperature increases the outgoin infra-red radiation, and hence, more heat is absorbe by the glass and reradiated from it until a balance o incoming and outgoing radiation is achieved. The effec of the current amounts of carbon dioxide and wate vapour in the earth's atmosphere is to raise the earth' average temperature by about 3.3°C, compared wit that which would result if the air were dry and free o carbon dioxide.

111. With current and prospective rates of energ consumption by the world-wide industrial civilization there is likely to be a 20-25 per cent increase in atmos pheric carbon dioxide by the year 2000. About a 10 pe cent increase may have occurred since the middle o the nineteenth century. If there were no complicatin factors, the greenhouse effect alone would result in rise in the average air temperature by several degree centigrade during the next 30 years. But many com plicating factors do exist, for example, a rise in th temperature will increase evaporation of water, an therefore the cloudiness, which in turn will reduce th amount of incoming solar energy, and tend to lowe the temperature. At present, it seems probable that th principal effect of added carbon dioxide by the yea 2000 will be a slight modification of the general circu lation of atmosphere, caused by a reduction in tem perature differences between high and low latitudes between winter and summer, and between the stratos phere and the troposphere [38] Over the longer term, th consequences might be much more serious, if fossil fuel continue to be consumed in ever-growing quantities.

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[37] *Ibid.*

[38] *Inadvertent Climate Modification, Report of the Study o Man's Impact on Climate*, sponsored by the Massachusett Institute of Technology (Cambridge, Mass., and London, MIT Press, 1971).

Increasing atmospheric turbidity

112. In recent years, the particle content of the air in the northern hemisphere has been growing rapidly, at first over cities, and now over vast areas in the temperate latitudes. The dust over Washington, D.C., has increased 57 per cent during the past 60 years. Studies of dust in the snows of the Caucasus Mountains of the USSR show a negligible change from 1790 to 1930, but a dramatic rise since 1930, increasing 19 times by 1963. A large fraction of the particles has been produced by volcanic eruptions, naturally occurring forest fires, winds over the desert and plant emission of hydrocarbons; the fraction produced by man may be as little as 7 per cent or as much as 45 per cent of the total. Atmospheric dust is produced by deliberate burning of savannahs and grasslands and by farming and over-grazing in semi-arid regions. Extension of cultivated areas and the intensification of agricultural and pastoral activities in the developing countries may thus be partially responsible for the observed increase in atmospheric turbidity during the past few decades. But probably the larger part of the human-produced particulate matter in the world atmosphere consists of sulphates and nitrogen compounds and other substances originating in the industries and transportation systems of the developed countries. [39]

113. Some evidence links agriculturally produced dust to the growth of desert areas. Bryson has suggested that the great Rajasthan Desert of western India and south-eastern Pakistan may have originated in this way. [40] He believes that several thousand years ago the climate was probably semi-arid and/or subhumid. With more and more intensive farming, the grass cover on the land was eventually destroyed. Clouds of dust blown into the air produced an excess of condensation nuclei for water vapour, and "rainless" clouds, consisting of very fine water droplets which could not coalesce into raindrops, were formed. As the rainfall diminished, the ground became drier and the dustiness increased. The continual dust transformed the land into a desert which is still growing in area, despite the fact that the air aloft holds as much moisture as the air over Panama and the valley of the Amazon.

114. One effect of rising atmospheric turbidity is to increase the reflectivity of the atmosphere to visible sunlight (called the "albedo" by climatologists). This may be the principal cause of the slight decrease in world average temperature since the early 1940s. It may be noted that the average albedo of the earth's surface is around 38 per cent. As can easily be seen from photographs of the earth taken on the moon voyages, the global albedo is largely the product of clouds, which on the average cover close to 50 per cent of the earth's surface. Any process that changes the cloud-covered area will have an almost proportionate effect on the albedo; and it has been estimated that, other things being equal, a 1 per cent change in albedo would cause the earth's average temperature to increase or decrease by roughly 2°C. Thus, human activities, such as irrigation agriculture, which increase the amount of evaporation and therefore tend to produce more clouds, and the operation of high-flying aircraft which produce spreading contrails that closely resemble cirrus clouds, would, if there were no other effects, tend to decrease the temperature. In fact, however, many other effects exist.

"Hot spots" from energy consumption

115. Even more uncertain and less understood potential climatic effects than those of carbon dioxide and atmospheric dust may result from the release of energy by fossil fuel combustion and nuclear fission. On a world-wide basis, energy from these sources is only about 0.005 per cent of that of the sunlight reaching the earth's surface. But it is very unevenly distributed. The proportion of fossil fuel and nuclear energy to solar energy increases by several orders of magnitude in large cities. In Manhattan (New York City), for example, over an area of about 60 km^2, heat generated by human activity is seven times greater than the incoming sunlight. At Moscow, in an area of nearly 900 km^2, human heat generation is three times greater than solar energy. [41] The average solar radiation coming into the "megalopolis" which extends from Washington to Boston along the east coast of the United States is 100 watts per square metre or a total of 7.6×10^{13} kilowatt-hours over the urbanized area of some 87,000 km^2. One can visualize what this means by imagining that the entire area is continually illuminated and heated by a grid of 100-watt bulbs spaced one metre apart. The total "man-made" energy is 3.3×10^{12} kilowatt-hours, equivalent to the burning of 400 million tons of coal, or 4.4 per cent of the incoming solar energy.

116. To maintain a heat balance, both the solar energy and the "man-made" energy must be carried away to outer space as fast as it comes in. Because the radiation away from any part of the earth depends upon the surface temperature, the additional heat produced by human beings will result in local warming. The effect in any particular region is mitigated by winds which carry off and disperse the heated air, but because the winds are very largely driven by temperature differences, the existence of "hot spots" produced by man must change the wind patterns to some degree.

117. Over Japan, the Federal Republic of Germany, the United Kingdom of Great Britain and Northern Ireland, and the eastern United States of America, containing about 3 per cent of the land area of the earth, the quantity of energy produced by fossil fuels and nuclear fission is 0.64 per cent of the incoming

[39] *Ibid.*

[40] R. A. Bryson, "Climatic modification by air pollution", report 1, paper presented at International Conference on Environmental Future, Helsinki, Finland, 27 June-3 July 1971.

[41] *Inadvertent Climate Modification, loc. cit.*

solar radiation, roughly 100 times the average value for the earth as a whole. These large "hot-spots" may have already brought about a change in the general circulation of the atmosphere, particularly when combined with the concentrated production of atmospheric particles from industrial activity in these regions. If economic growth continues and involves more countries, there could be serious climatic consequences. If, as has been estimated, total production of "man-made" energy rises eventually to 3.5×10^{15} kilowatt-hours per year (3.2×10^{21} calories), and this energy use is concentrated [illegible]

[illegible]

proved analytical models of the dynamics of the atmosphere are needed, so that climatic change which would result from such a change in energy distribution can be predicted in time for suitable adjustments in the character and location of agriculture and the distribution of populations.

118. Climatic alterations from "natural" causes have occurred since the beginning of civilization some 8,000 years ago, with serious consequences for human affairs. But these changes apparently occurred relatively slowly, giving time for the world population to adjust to the new conditions, though individual people and regions suffered severely. With the rising interdependence of human beings everywhere, adjustments might be made less painfully in the future, even if human activities sharply accelerate the rate of change, provided realistic climatic forecasts could be made. Development of the ability to make such forecasts depends on accurate monitoring of changes in the carbon dioxide content, turbidity, heat release and other atmospheric characteristics and their possible climatic effects, and the development of analytical models of the atmosphere, using large computers. International co-operation in monitoring and analysis is essential.

Population and settlement

Benefits and costs of alternative settlement patterns

119. Many urban problems of the environmental type, the so-called "external diseconomies", such as air pollution, traffic congestion, psycho-social stress and crime, are generally assumed to occur in large cities because of their "bigness". On this ground, settlement strategies have been devised which have as their objective reducing, if not arresting, the growth of the large cities by diverting migration flows to smaller towns or even by retaining more people in rural areas. Such strategies, however, may not be quite relevant to the problems at hand, since the relationship between the problems and mere size of the cities is far from being clear. In fact, the specific causes of [illegible] problems are only accidentally associated with [illegible]. Air pollution, for example, is the result of the use [illegible] vehicles and of the functioning of certain industri[illegible]. Both may be more frequent in large cities, but that [illegible] so not because these cities are large, but because urb[illegible] bigness and pollution are concomitant of a *laissez-fa[illegible]* industrialization in which overcrowding and polluti[illegible] problems were not cared for in advance. In order [illegible] prevent the aggravation of air pollution in big cities [illegible] more effective method would have been to deal direc[illegible] with the source of pollution rather than to adjust [illegible] size of the cities. Similarly, there is no evidence t[illegible] larger cities as such cause more stress or social disor[illegible]nization, although these conditions are, in fact, m[illegible] frequently found in big city slums, where deprivation [illegible] conceivably a causal factor. Again, slums, poverty a[illegible] deprivation are not caused by the size of cities, [illegible] result from a process of social change which tends [illegible] transfer to large cities the poverty previously conceal[illegible] in smaller towns and rural areas.

120. Attempts have been made with the help [illegible] some models to show how an "optimal size" of citi[illegible] could be determined. These models assume that, f[illegible] example, benefits and costs are additive and can [illegible] measured in monetary units. That is hardly the cas[illegible] however, since many benefits and costs are of such [illegible] nature that it is impossible to add them or even [illegible] compare them.[43] How can one evaluate, for instanc[illegible] the availability, in large cities, of public services an[illegible] "special" cultural facilities such as first-rate theatric[illegible] performances, and compare them with the annoyanc[illegible] of having to put up with noisy neighbours or with [illegible] congested mass transport system? Another unrealisti[illegible] assumption made is that the interests of all inhabitant[illegible] of the city are identical so that one can think of averag[illegible] benefits or costs derived from different city sizes. Scal[illegible] economies in public services, for example, may enable a poor city dweller to have running water or a telephone in his home, while a rich person may take such facilities for granted and may even be prepared to pay higher taxes or tariffs for them if such expenses would [illegible] [illegible] annoyances which can be attributed to a larger size of the city. Therefore, it does not seem [illegible] to think of an "optimum city size" for all [illegible] [illegible] population.

121. [illegible]

122. [illegible]

[42] A. M. Weinberg and R. P. [illegible], vol. 58 (1970), p. 412

[43] [illegible]

such as the size of the country, its stage of development and its place in the international division of labour. It is conceivable that the "optimum city size" of a small highly developed country, specializing in the export of watches, could be very different from an "optimum city size" of a big country, largely undeveloped, specializing in the export of primary goods. Priorities in each of these countries would be quite different, and, therefore, their settlement strategies must also differ.

123. The problem of the size of cities has often been approached with the preconceived idea that "bigness is bad", with the result that social costs derived from large sizes have been underlined without due appreciation of their economic and social benefits. Such benefits are particularly important for developing countries. Development involves urbanization to a very large extent, and, therefore, any developing country must bear heavy expenses for the building of an urban infrastructure which is of the highest priority for these countries. The benefits of scale economies in the building of the urban infrastructure are very important. The ubiquitous congestion of urban services—traffic bottlenecks, overcrowded omnibuses, overburdened telephone lines, scarcity of lodging—in large cities of developing countries should be seen not as a proof that such cities are too big, but rather as an indication that the resources for urban investment are too scarce. Scale economies derived from large city sizes can also produce social benefits. The unit costs of such social services as schooling and public health are smaller in large, densely settled places, because of the more intensive use of the capacity of the equipment. Besides, the larger demand allows for more specialization leading to the improvement of the quality of social services. [44]

124. Clearly, most problems of large cities cannot be ascribed to their size, but, perhaps, they are to be attributed to the fact that cities are growing too fast to maintain environmental and quality-of-life standards. This possibility may be examined by considering the problem of unemployment, which is so conspicuous in large cities of developing countries. It is likely that there would be fewer jobless people in the city if fewer migrants came to it every year. But, as soon as one becomes interested in what these excessive migrants ought to do, one realizes that the problem of unemployment cannot be solved within the contour of the city. This means that it may well be, although not necessarily, that the creation of new jobs is easier or cheaper in large cities than in the countryside or in newly formed "growth poles". The same can be said of other large city problems, such as congestion, the shortage of housing and urban services. Excessive demand is undoubtedly the consequence of too rapid growth of the population of the city. What should be indicated, however, is that in smaller cities and in the countryside, housing conditions and urban services are usually not much better. In developing countries, it is true that the symptoms of congestion and scarcity are not in evidence in small towns. That is so, however, not because the supply is adequate considering the needs all inhabitants, but merely because most of them cannot afford to demand better housing conditions or urban services. Congestion and scarcity in large cities are often the consequence of a rise in the nominal income of newcomers.

125. Objections have been raised to the effect that the central city is too privileged in relation to the remainder of the country—it absorbs most of its income, concentrates much of its "modern" industry, contains most of the better-paid jobs and investments in urban infrastructure etc. This complaint against primacy is logically inconsistent with the complaint that living conditions are bad in primate cities because they are too big; but both complaints lead to the same prescription: to divert growth from the largest city (or cities) in order to form a more balanced settlement pattern. [45] It cannot be said beforehand if a strategy to avoid primacy is adequate or not without considering the specific conditions of each country. Small countries, for instance, cannot afford to have more than one large city, and, if they are poor, economic priorities could justify a high degree of primacy. Countries with a large population and a great territory may reap definite advantages from a more widespread urban settlement pattern. As in the case of city size, there is no "optimum settlement pattern" unrelated to the specific conditions of a country at a given point of time.

126. The settlement pattern of a country at a given time is the product of past decisions, made by individuals, firms and public authorities. Individuals and firms are supposed to follow the so-called "market forces", which means that their locational decisions are essentially made according to economic criteria. But, even to the extent that locational decisions are the outcome of some costs and benefits calculations, they are looked at from the narrow viewpoint of the individual and the firm, who cannot know how the decisions of other individuals and firms will affect their own. Obviously, in these conditions, many mistakes are unavoidable and cannot be corrected, at least in the short term. Migration, for instance, for a family which leaves the countryside, is not an easily reversible movement. This is even more true of firms, which must put a considerable amount of funds in buildings and equipment.

127. Centralized decisions (i.e., those made by public authorities) are often made according to longer run criteria, planned in part to correct the settlement pattern produced by decentralized decisions (i.e., those

[44] W. R. Thompson, "Duas experiências americanas", *Dialogo* (São Paulo), vol. IV, No. IV (1971).

[45] R. M. Morse, *La Investigación Urbana Latinoamericana: Tendencias y Planteos* (Buenos Aires, 1971); J. Friedmann, "A conceptual model for the analysis of planning behaviour", *Administrative Science Quarterly* (1967); A. Quijano, "Dependencia, cambio social y urbanización en América Latina"; and M. Castells, "La urbanización dependiente en América Latina", both in M. Schteingart, ed., *Urbanización y Dependencia en América Latina* (Buenos Aires, 1973).

made by individuals or firms). No Government decides where to locate new railway, electric-power plants, harbours or oil refineries by simply accepting passively the demands of the private sector of the economy There is always a desired blueprint of the spatial distribution of economic activities which is the objective of such decisions, although it is not always made explicit.[46]

128 What may be questioned is whether all the consequences of centralized decisions are fully understood by those who make them. One common mistake is to expect too much from locational decisions. The effectiveness of resources may be enhanced by shifting resources from one location to another, but only to a certain extent. And the response of the population will be relatively slow, mainly because migration flows have a momentum of their own Therefore, grandiose national population strategies should be carefully weighed, mainly because. (*a*) they may produce unexpected consequences which may be harmful, such as the destruction of natural resources in areas for which adequate technologies are still unknown, (*b*) they may divert attention from much more urgent tasks, such as the redistribution of costs and benefits in already settled areas. Poverty, unemployment and similar social problems are often a consequence of institutional factors, such as a high degree of concentration of land ownership or the lack of bargaining power of common labourers in the labour market. It would often be difficult in many cases to try to remedy such conditions by means of a population redistribution policy

Internal organization of metropolitan areas

129. The population of metropolitan areas is growing rapidly everywhere In the developing countries, where the total population is growing quickly and where an increasing proportion of population is becoming urbanized, metropolitan areas display remarkably high rates of expansion This speed of growth would seem to be at the root of many deficiencies that afflict the poorer sections of the population of metropolitan areas. The urban way of life requires the use of such services as transport, telephone and schools, the supply of which is limited by the availability of equipment. Since the use of such services in a metropolis is unavoidable, it is easy to see why the demand for them tends to grow at the same rate as the metropolitan population. The shortages arise from the fact that the expansion of most urban services requires previous savings and accumulation of capital which is usually not available

130 Such shortages could be eased if the growth of the metropolitan population, and therefore the demand for urban services, could be slowed down But, as was seen above, such a "solution" would—even if feasible—merely deflect the pressure of demand from metropolitan areas to somewhere else. Any real solution must be sought in the supply side, with answers to such questions as (*a*) how to speed up the expansion of urban services, and (*b*) how to redistribute the available supply among the population in order to make the existing shortage more bearable. If the authorities expand urban public services in the areas where the poorer population lives, the value of the land in these areas tends to increase, rents go up, and, after a time, most of the poorer population is forced to move from the area because it cannot afford to continue to live there If the expansion of these services, which are often subsidized by public funds, is meant to help the poorer sectors of the population, some public control of rents and land use is imperative

131 In metropolitan areas of developing countries, the poorer sectors of the population cannot afford to pay for the use of urbanized land Hence, they squat on vacant lots, as near as possible to the better-off residential areas, where there is a sizable demand for personal services As soon as these lots increase in value, the squatters are removed to some so-called "low-cost housing project" where they are far away from their jobs and, thus, more deprived even than before Squatter settlements are usually seen as the worst marks of poverty in metropolitan areas of developing countries Public authorities are often eager to get them out of sight, assuming that better housing is the most important need of the poor people In fact, most people who live in squatter settlements of metropolitan areas would prefer to continue in the same location, from which they can get what they need most, namely, work If these people are to be helped, their stay should be assured in the form of a semi-permanent settlement Then, and only then, should they be supplied with essential services, such as water, sewage and waste disposal, transport and schools The housing problem, as such, should not be neglected, but it should be given an appropriate priority in their scale of preference This means that some poor people, with rural backgrounds, may possibly prefer to build their own houses according to their tastes and needs; and that what they mainly require is space, suitably located, and perhaps some technical assistance and materials Others may prefer houses of brick and concrete, but their desires and aspirations should be compatible with their levels of income

132. The cost of providing a decent level of living to the growing metropolitan population can be considered a social cost extending over the society as a whole and an individual cost for the consumer. For some "essential" goods and services, the individual costs are deliberately subsidized, i e, individual costs are kept below social costs and the difference is paid out of public funds Since the poverty of the metropolitan masses cannot be eliminated in the short run, the alternative solution is to subsidize the services and goods which are required if these masses are to

[46] Lloyd Rodwin, *Urban Planning in Developing Countries* (Washington, D C, United States Department of Housing and Urban Development, 1965)

be integrated in the metropolitan economy.[47] An important question is, therefore, how to reduce or at least keep at a low level the social costs of metropolitan urbanization. This requires continuous technical innovations, new forms of mass transportation, large-scale building techniques, new techniques of recycling waste materials and so on. It also requires long-run structural planning, according to which suitable levels of density in different localities of the metropolitan area have been determined. The space requirement for an urban population is quite large and goes much beyond the dwelling-space; it encompasses the need for a place to stroll and meet other people, areas for games, places to hold public meetings etc. The density in residential areas, even of poor people, should not be too high, since one of the worst marks of metropolitan poverty is crowding. But density may be much higher at nodal points, where the location of offices, shops and access to transport justify some sacrifice of dwelling-space.[48]

133. Another important aspect that needs to be planned is the spatial distribution of different economic activities—industry, shopping, offices, dwellings—in order to get the best out of such heavy investments as the public transport system, the water-supply network and so on. The spatial distribution pattern produced by decentralized decisions bears the weight of the inertia which hinders people as well as businesses from adjusting (at least in the short run) their locations to the changing conditions of a quickly growing metropolitan area. Families tend to cling to their homes, where their friends live close by and where they can get credit from the shopkeepers. Firms may also cling to their locations, essentially because of the resources invested in buildings and fixed equipment. The expansion of the metropolis often puts a premium on older and better serviced areas, in which families are slowly replaced by offices, banks, advertising firms, clinics etc. Hence, more and more people have to move down town every day to work and to shop, overburdening some transport lines. New industries tend to locate in the periphery, where land is still cheap; but their central offices are usually in the old centre, close to the banks and government agencies. As a result of all this, the demand for public utilities becomes ever more spatially unbalanced. The daily journeys to work or to school become longer and more tiresome, and the social cost of the urban infrastructure therefore increases much more than if the spatial distribution had been carefully laid out in advance with the purpose of adjusting to future growth.

134. The other problem is how to set the consumer prices of basic urban services in such a way that the majority of the metropolitan population may have access to them. As was seen before, setting individual prices below social costs would not be enough because the unavoidable scarcity of these services would increase the cost of the access to them by putting a premium on the locations from which they can be reached: streets close to the public transport system, served by the networks of water-supply, sewage disposal, telephone etc. The high value of the land in these locations may prevent the full use of the existing capacity of the networks. Usually, many houses in these areas remain empty because of high rents, while people live in crowded tenements in slums and shanty-towns, without access to public services. To prevent such situations, in which the subsidies for basic services become the source of profits to private groups, the provision of basic services and of housing (at least for the poorer section of the population) should be administered by some kind of non-profit organization. One effective measure would be public appropriation of the urban land in metropolitan areas, although this may be difficult due to the institutional framework in many countries. At least, heavy taxes should be levied on empty dwellings in the well-serviced areas of the city in order to stimulate their owners to rent or sell them at reasonable prices.

135. One strategy for transferring resources from the private sector to public authorities in charge of the development of new urban areas is the purchase of undeveloped land by the latter, who resell it later, after the area has been provided with most urban services. The enhanced value of the developed land is then used to finance (or to repay) the investments made in the infrastructure. In such a strategy, the profits are reaped by a public corporation.[49] As soon as the development of the purchased land is completed, however, the financial and social aims of the operation come into conflict. From the financial point of view, most of the land should be sold at the highest price. But this would again deliver the benefits of the urbanization of the area only to higher-income groups. In order to favour the poor also, some of the land must be kept as public property and be let at subsidized rents. It would, moreover, be advisable to locate the subsidized and unsubsidized areas as close as possible to each other so that segregation of the poor may be avoided. The purchasing power of the higher income strata usually attracts services of a higher standard—such as supermarkets, clinics and libraries—which may also be used by their lower income neighbours (if they are close enough).

136. The internal organization of metropolitan areas could also be improved considerably if in the decision-making structure a clear distinction was made between "political" and "technical" options. Very

[47] An adequate mass-transport system, for instance, should be considered not only a necessity of the poorer population, which cannot afford motor-cars, but a requirement of the metropolitan economy. One of the specific advantages of the metropolitan economy is its large and diversified supply of manpower. This advantage is lost if the working population cannot move efficiently and cheaply from their living-quarters to any working-place in the metropolitan area. The mass transport system should be considered, along with the schooling system, sanitation etc., a sort of public investment that helps to create an adequate metropolitan labour force.

[48] C. Correa, *loc. cit.*

[49] "Some policy issues regarding urban renewal", in *Planning of Metropolitan Areas and New Towns* (United Nations publication, Sales No. E.67.IV.5), pp. 79-89.

often, "technical" alternatives involve different distributions of costs and benefits This means that although the costs and benefits of the alternatives can be compared, they may benefit different groups of the metropolitan society. So, for instance, the choice between freeways, roads etc, and an underground mass transport system cannot be expressed only in terms of costs and benefits, since the first option may favour motor-car owners much more than those who cannot afford motor-cars, the reverse being true of the second option In such cases, the option is in fact "political" and should be properly decided on that level, by people who have an explicit mandate to do this It often happens, however, that such options as these are framed in very technical terms, so that laymen are easily confused. In this way, options that are really political are taken to be technical and the decision about them is made by technicians, who cannot help but use their own values and preferences in making such decisions

137. Political decisions made by technicians suffer, in general, from two types of bias. the bias of the specialist and the bias of modernity. Technicians as specialists are inclined to prefer their own field of activity. Therefore, decisions taken by them tend to be in the field of their specialty. Problems of traffic will hardly be solved by increasing or decreasing density in certain areas, since specialists in transport are trained to find solutions by handling the transport system as such and not the demand for it. It is not true, however, that the best solution of a problem always lies in the field of specialization in which the problem is formally included Political authorities may ask different specialists to look at the same problem and then choose among different alternatives, taking conflicting interests explicitly into account The probability that the final decision will favour the interest of the majority will be much greater if all political options are recognized as such, instead of being decided as technical questions by a handful of specialists. This should not be understood as a denial of the importance of the technician in handling the problems of metropolitan areas The proper role of the technician, however, is not to replace the public authorities, but to contribute to the political debate, helping to make the final choice more rational and efficient. The decision-making hierarchy of metropolitan areas should, therefore, be powerful enough to plan its development effectively, combining technical advice and political debate in such a way that the needs and wishes of the majority get the highest priority.

Locational policies and experiences relevant to rural development

138 The manifold aspects of locational policies and experiences relevant to rural development can be put together in a clearer focus if the demographic dimensions are indicated at the very outset A series of United Nations studies provides relevant data for the growth of rural population during the past two decades, 1950-1970, and projections for the coming three decades, 1970-2000. A detailed look at these data brings out the following four important aspects of the growth of rural population:

(*a*) In the more developed regions of the world, the rural population is decreasing in absolute size indicating rural depopulation;

(*b*) In the less developed regions, there is a continuing increase in the rural population in absolute terms, and several major developing countries are facing rural over-population;

(*c*) The rate of increase of the rural population in the developing countries, however, is much less than that of the urban population. As a result, there is a continuing decrease in the proportion of rural population to the total population and a corresponding increase in the proportion of urban population. But even at the end of this century, the less developed regions will continue to be predominantly rural while the developed countries will be overwhelmingly urban,

(*d*) Looking at the regional projections for the future (1970-2000), the most striking feature encountered is that rural populations are estimated to grow faster in South Asia and Africa than the urban populations of Europe and Northern America. Thus, environmental problems created by rapid population growth are as much rural as urban.

139 Therefore, unlike the developed countries of *the world, the developing countries are faced with the* double dilemma of urbanization and rapid growth of the rural population To put it simply, in these countries, both the rural and the urban populations are growing fast. In absolute terms, the growth of rural population is substantial, but in terms of growth rates urban rates are higher. Both create problems of resource mobilization and development

Rural-urban migration

140 Historically, increases in agricultural productivity and mechanization of agriculture released surplus labour on land which was siphoned off to urban areas and absorbed in non-agricultural occupations In many developing countries today, the industrial-urban complexes are not able to absorb the surplus labour from rural areas at a rate commensurate with the rate of growth of the rural labour force, but still people migrate to the cities in search of jobs This is supposed to give rise to the phenomenon of "over-urbanization", and often a plea is made to check such migration to the cities It should, however, be pointed out that over-emphasizing the problems of big cities created by the so-called "human avalanche" of migration underestimates the positive role of migration in relieving rural poverty. There has been inadequate realization of the role of cities as "reception centres" for the rural poor. The tendency to look upon rural-urban migration and the consequent urbanization as undesirable phenomena is to shut one's eyes to economic reality. This is not to deny the urgency of positive measures to regulate rural-urban migration But the view that, since rural-

urban migration gives rise to serious problems, such migration should be curbed, is an oversimplification. One should ask: serious problems for whom? Certainly not for the rural migrant (who gets or hopes to get higher earnings in the city) despite all the hostilities of the urban environment. Inasmuch as urban poverty is an outflow of rural poverty, action against poverty should be directed primarily towards the rural areas. In this sense, accelerated rural development is the best deterrent to rural-urban migration.

141. It has also been emphasized that rural-urban migration is accelerated not only by rapid population growth, but by agricultural stagnation and the resulting underemployment and unemployment. In conditions of rapid population growth and agricultural stagnation, the flow of migration from rural to urban areas cannot be stemmed merely by restrictive policies in urban areas.

142. On the other hand, the large increase in the urban labour force as a result of high rates of natural increase in population, and the economic stagnation of cities and the strained urban infrastructure put a curb on rural-urban migration in many developing countries. This generates a large "turnover migration" of persons who move from place to place in search of jobs and very often the unsuccessful migrant comes back to his village having failed to find a job in the city. To take the example of Calcutta, it was found, according to a socio-economic survey of the city, that the rate of unemployment was lower among migrants than among original residents.[50] The most probable explanation of this phenomenon is that a large number of migrants who are unable to secure any job in the city after staying there for a certain period generally go back to their native places or some other place.

143. There are not enough jobs in the city and yet one may ask why the migrants keep on coming. Another study of Calcutta explains it as follows: Take the probability of 10 rural people seeking jobs in the city; beginning today, three will get a job within six months. Suppose, however, that if these 10 people looked for jobs in their native area, only one in 10 would get a job within six months. Then, for any person, the chances of getting a job in the city are three times as bright as if he stayed in the native area. Therefore, even if the job situation is bad at Calcutta, it may still be very much more attractive than prospects in rural areas. This clearly brings out the fact that no matter how bad the situation is in the cities, it is unlikely that large-scale migration would be occurring if conditions were not even worse in the countryside.

144. A common feature of several developing countries in Asia is an excessive dependence on agriculture, and one of the primary objectives of development planning is to reduce this dependence and evolve a more diversified occupational structure. However, on account of excessive population growth, as well as the colonial background and related factors, there has been a structural stagnation in these countries. When the economy falls into this trap of stagnation, there is no shift of labour from agriculture to industry and the proportion of agricultural labour force remains more or less constant. Naturally, in countries where a predominant majority of the population depends upon agriculture and the major share of the national income is derived from agriculture, any population policy which seeks to influence fertility behaviour must take note of this basic economic reality. Unless the social and economic life of the rural masses is touched by policy measures, economic and social stagnation cannot be broken.

145. The population problem thus cannot be viewed merely in terms of an accelerating growth rate caused by a persistently high birth rate and a rapidly declining death rate. The population problem in the developing countries of Asia is much more a problem of structural stagnation resulting from the dependence of a persistently high proportion of the working force on traditional agriculture. Considered from this viewpoint, improvement in agricultural technology and the modernization of agriculture will not only have a bearing on agricultural productivity, but will release forces of modernization which will affect the attitude towards family size.

146. Differences of opinion have been expressed about the nature of such structural stagnation. Some doubt exists whether it could result from exogenous factors of population growth and colonial economy rather than from the inherently anachronistic characteristics of societal structure itself. The former factors, far from creating stagnation, have been changing societal structure, though not in a direction likely to ensure an optimal rate of resource development and the maintenance of a high level of environmental quality. Hence, the task for which new policies of population redistribution in rural areas are needed must be to find ways of reversing these trends and making changes proceed in the desired direction.

147. In this context, it may be mentioned that in sparsely populated countries of Africa, rural-rural migration and internal colonization movements are as important as rural-urban migration. The need further to stimulate these movements has led to considerable concern over the way in which government can intervene in the face of intense feeling of ethnic territoriality. In other words, in multi-ethnic countries where some ethnic groups have more land than they need and others are overcongested on limited agricultural land, the question arises how government can assist in achieving better distribution of population. Part of the problem here is that as long as action is taken on a person-to-person basis, the level of social conflict has been kept to the very minimum. If it were raised to the level of conscious public policy, it would be bound to give rise to various political difficulties. Perhaps it is in such

[50] A. Ghosh, *Calcutta—The Primate City*, Census of India, 1961, monograph No. 2 (New Delhi, 1966), pp. 143-144.

areas that much attention needs to be given to "hidden policies" which operate on the inflow side of migration to affect the destination of moves.

148. In this context, it must be emphasized that the development of rural areas *per se* will not necessarily lead to reduced rural-urban migration, unless rural-urban disparities in wage rates, income levels and employment opportunities decrease over time It is not always rural poverty which encourages out-migrations from rural areas Even in the developed countries, rural-urban migration is motivated by higher incomes and increased availability of non-agricultural jobs in cities

149 It is also important to bear in mind that all over the world young people migrate from rural areas to cities, not always because of economic reasons Unless the image of rural areas improves, rural development alone will not be an effective deterrent to such migration It is often argued that improved rural housing could slow down the tempo of rural-urban migration. Rural housing has clear implications for better environmental conditions. However, experience in different parts of the world indicates the intrinsic inadequacy of such a policy for influencing migration It has been realized that a rural housing policy to be successful as an instrument of population redistribution policy must be part of a broader agricultural policy designed to enhance agricultural productivity and rural incomes

Population redistribution and rural development

150 On the important issues of dispersal of industries, balanced regional development and population redistribution, the experience of several countries of the world may be referred to The general trend of thought throughout the world is in favour of the dispersal of industries, the development of new growth centres in medium-sized and small towns, the establishment of new towns, market towns and service centres, the improvement of rural housing, the creation of better employment opportunities in rural areas, the improvement of mass transportation and a host of other measures to counteract the lop-sided growth of metropolitan areas and big cities There are several other related issues, such as community development programmes, resettlement schemes, rural works programmes, tax incentives, tax relief and other fiscal encouragement given to industries to move out of congested urban areas or start new units in neglected areas, depressed pockets etc It has been realized, however, that while the philosophy of such measures is not challenged, their economics remain controversial, especially in the developing countries Further, in the absence of adequate theoretical and empirical studies on the subject, much of the thinking is guess-work and speculation, the solutions offered tend to be obvious and simplistic, and the implementation of whatever policies are put forward is by and large ineffective and incapable of meeting the challenge of the crisis of human settlement

151. The role of small towns also deserves particular attention In many countries of the world, there is an increasing trend towards the stagnation and even decay of small towns According to some students, small towns under modern conditions can flourish only as market towns and service centres catering for the needs of agricultural development and rural modernization The "green revolution", in fact, strengthened the case for such towns

152 Some have claimed that the Union of Soviet Socialist Republics avoided the acute problems of stagnation of small towns. The planned development of the Soviet economy assigned an important role to small towns, as being necessary for the exploitation of forests, coal mines and mineral development, for servicing chemical, power and other enterprises; and also for use as tourist centres and health resorts In spite of the emphasis on small towns in the USSR, however, the world-wide trend towards increasing concentration of population in big cities could not be contained, as is evident from the fact that the number of towns in the Soviet Union with a population of over 100,000 increased from 33 in 1926 to 148 in 1959 and to 221 in 1970 In 1926, these towns comprised 37 per cent of the total urban population; in 1959, 49 per cent; and in 1970, 56 per cent. [51]

153. The impact of the "green revolution" on out-migration from rural areas should also be considered The evidence of some studies indicates a sharp reduction in the rate of out-migration from rural areas under its impact On the other hand, one of the side effects of the "green revolution" has been a trend towards increasing disparities between the rich and the poor. The success of the "green revolution" depends upon the availability of high-yielding varieties of seeds, assured water-supply and fertilizers, all of which are more readily available to and more easily utilized by the large-scale farmers than by the small-scale farmers Economic growth has been said to create the illusion of compensating for the inequality of income It is, therefore, very important to consider the adverse effects of new technology on income distribution. Another related issue is the increasing trend towards mechanization of agriculture in "green revolution" areas, in spite of the existence of large labour surplus in the country as a whole This again is a case of technology having an adverse effect from the point of view of absorption of the surplus labour force These and many other issues have to be considered if the implications of the "green revolution" are to be assessed from different angles In the current state of knowledge, it is not possible to arrive at any definitive conclusions on the subject

154. The role of regional planning must also undergo scrutiny It is well recognized that both in market

[51] A V Nevsorov, "Population and settlement, comments", paper submitted to the Symposium on Population, Resources and Environment, Stockholm, 26 September-5 October 1973 p 2

economies and planned economies, and in both developed and developing countries, it is only through comprehensive regional planning that the various problems of rural development raised here can be successfully tackled. It has been realized that consideration of single problems and single solutions will not succeed. What is needed is a holistic view and total solutions.

Locational policies and experiences relevant to urban development

155. As in the previous section, what is first given is a broad indication of the demographic dimensions of urban growth. A detailed look at the relevant data for the growth of urban population during the past two decades (1950-1970) and the United Nations projections for the coming three decades (1970-2000) brings out the following four important aspects of the growth of urban population:

(1) In the past, the total urban population of the more developed regions of the world was greater than that of the less developed regions. This trend is undergoing a process of reversal in the current decade; and in 1980, the urban population of the less developed regions of the world is expected to be higher than that of the more developed regions. This trend is likely to continue, and in 2000, the urban population of the less developed regions will probably be about double that of the more developed regions. Environmental problems arising out of rapid urbanization should therefore be as much a concern of the developing countries as of the developed countries;

(2) As already pointed out in the earlier section, in the world as a whole, the proportion of the urban population is projected to be a little over 51 per cent in 2000. Thus, the majority of the world's human population will be living in urban areas of the world for the first time in the history of mankind. However, there will be disparities between the developed and the less developed regions. In the more developed regions, the urban population would be around 81 per cent of the total population; and in the less developed regions, the urban proportion is projected to be around 43 per cent;

(3) The trend is similar in the case of "million-cities". In 1970, there were more million-cities in developed countries than in the less developed countries. From 1975 onwards, the trend will be reversed; and in 1985, it is estimated that there will be 126 million-cities in the more developed regions compared with 147 such cities in the less developed regions. Likewise, in terms of the distribution of population of the world's million-cities, the less developed regions will gain predominance from 1975 onwards. In 1985, about 58 per cent of the population of the world's million-cities are expected to be in the less developed regions, compared with 42 per cent in the more developed regions;

(4) Another indication of the increasing role of million-cities in the less developed regions is given by the proportion of the urban population residing in such cities. Whereas in 1970, 32 per cent of the urban population in the more developed regions resided in the million-cities, compared with 29 per cent in the less developed regions, in 1985, the proportion is expected to increase to 37 per cent for both. In other words, the structure of the urban population would be very much the same in these two groups of countries as far as the role of million-cities is concerned. Thus, million-cities would be as much a problem for the developing countries as for the developed countries, despite a much lower urban proportion in the developing countries. This has obvious implications for environment because of the inadequate infrastructure of the big cities in the developing countries of the world.

156. In 1970, 53.7 per cent of the world's population in the million-cities was residing in the more developed regions, while 46.3 per cent of this population was in the less developed regions. The trend will be reversed from 1975 onwards. In 1975, 51.4 per cent of the population of the world's million-cities will be in the less developed regions. This figure is likely to increase to 54.4 per cent in 1980 and 57.7 per cent in 1985. In the decade 1970-1980, the annual rate of increase in the population of million-cities is expected to be 2.8 per cent in the more developed regions, compared with 6.2 per cent in the less developed regions. Thus, contrary to the popular impression in many quarters that the problems of urban development and environment are not so intense in the developing countries because of their low proportion of urban to total population, an analysis of the million-cities shows that urban problems manifested by the growth of million-cities are, in fact, more intense in the developing countries than in the developed countries.

Urban growth strategies

157. The discussion of urban growth strategies based on the experience of a number of developed as well as developing countries indicates the range of efforts made from time to time to tackle the persistent and growing problems of urbanization. Interestingly enough, most of the Governments concerned with these issues began to think in terms of comprehensive urban strategies only when a wide range of specific and obdurate problems became highly crystallized. In the initial period, these Governments dealt with such components of the problems as housing, industrial location, transportation, recreation and education. It was soon realized that what confronted them was a host of related problems, such as city/hinterland relationship, problems of poverty and lagging regions, and the complex problems of managing the economy. This led to a quest for the elimination of inconsistencies and for a greater coherence the objective of which was more effective means of policy implementation, while formulation of urban growth strategies often rested on untested assumptions, such as the disadvantages of big cities and the feasibility of promoting growth centres, which are very difficult to define operationally. Besides, "one does not really

know when a city is too big or too congested rather than merely poorly organized, and man has as yet learnt little more than the rudiments of how to convert an urban centre into a growth centre and how to radiate the effects of such growth centres over surrounding hinterlands".[52]

158. Population settlements can be classified in the following broad categories (*a*) giant cities, indicating cities with a population of 500,000 or more, (*b*) large cities, indicating cities ranging between 100,000 and 500,000; and (*c*) smaller urban-rural settlement complexes, comprising small or market towns, villages and other rural settlements

159. The policy implications arising out of the experience of various countries have been summarized neatly in the form of seven propositions, as follows.

(1) For the next generation (15-20 years), it is probably not feasible (nor desirable) in most developing countries to stop the spread or the growth of population of the giant cities, but it may well be feasible (and desirable) to lower their rates of growth in relation to the growth rates of other urban centres,

(2) Fostering large cities is one of the best means of countering the growth of the giant cities,

(3) New towns and expanded towns should serve, rather than ignore or frustrate, the basic aims of settlement strategies;

(4) If a policy of decentralization is pursued, the choice of regions is of critical importance and should be related to the goals, constraints and development opportunities, with special concern for equalization and spread effects;

(5) Although encouraging decentralization in large cities may be a reasonable policy, given the current state of knowledge, it is politically defensible only if there are appropriate complementary efforts to assist other problem regions,

(6) National strategies for urban development will be seriously handicapped until the resources and capabilities of local government are greatly strengthened,

(7) A basic question confronting urban development strategies is how to ensure that the groups which should benefit from growth will actually do so [53]

160 Among other important policy issues to be examined is the question of public control over urban residential land and the need for effective curbs on land speculation There have been differences of opinion, however, on the issue of public ownership of urban land Attention has been drawn to the observation of an eminent planner of environment, who maintains that "... as long as land is a freely disposable private commodity and speculative profit is a basic factor, large-scale logically related development is not going to take place " [54]

161 It has been recognized that a national system of incentives and controls to reinforce an urban growth strategy must be evolved An examination of the different approaches towards evolving such a strategy tried by several Governments would lead to the following conclusion In general, the free market tends to favour concentration, whereas making the issues explicit tends to consolidate political pressures and to favour dispersal Thus, the great task of urban statesmanship is to develop the necessary political expertise to steer a middle course for a reasonable period in the future

162 The role of new towns should be examined briefly Attention may be drawn to the summary and conclusions of the United Nations Seminar on New Towns, held in London in 1973, which discussed this subject at length It should be recalled that the new towns approach is of an innovative and experimental nature rather than an effective policy instrument for influencing the over-all pattern of urbanization New towns are unlikely to absorb a large fraction of those seeking urban residence in countries with rapid rates of population growth and migration

163 Among other issues to be considered is the question of transportation, especially the need for a public transportation system In some areas, the bicycle has played a major role in transportation, which not only has obvious implications for pollution control, but raises broader issues of social values High-cost transport has far-reaching implications for the future pattern of urbanization In fact, high transport costs, especially in the developing countries of the world, might put a *brake on the process of suburbanization and even* reverse it, leading to further concentration in the already overcrowded cities, and giving rise to serious environmental problems As concerns the role of transport in influencing urban growth strategies, one of the conclusions of the United Nations Seminar on New Towns needs reiteration

> "If traffic problems of large cities could be solved not by devoting ever-increasing resources to meeting traffic requirements but by reducing such requirements without loss of efficiency, and if the rise in land values resulting from growth could be retained and used by the community, the basic problems of large cities would be in large part solved. The solution, however, would entail such a sharp break with the trends that have been allowed to become established in developed countries that it probably would be unacceptable politically in such countries Whether it would be equally unacceptable in developing countries is a moot question, since no real

[52] Lloyd Rodwin, "National policies and experiences relevant to urban development", *Population Debate*, vol II, part five, para 17.

[53] *Ibid* These propositions are discussed in paras 30-50

[54] A Mayer, *The Urgent Future People, City and Region* (New York, McGraw-Hill 1967)

attempt has been made in such countries to implement the solutions."[55]

Question of curbing migration to cities

164. The weaknesses of the simplistic view that migration to the cities should be curbed in order to improve urban conditions are generally recognized. It is necessary to consider the role of migration in the total process of urbanization, economic growth and social change. It has been stated that cutting off the city from the influx of able young men leads to cultural and intellectual stagnation. It may be recalled that the United Nations Seminar on New Towns pointed out the idea that a forced slowing-down of migration from rural areas would solve the problems of urban development could be considered to lack realism; it is difficult to find any examples of this process taking place successfully as it is not viable economically and is socially unjust.[56]

165. Two approaches to the problem would appear to emerge: (*a*) the closed-cities approach, which seeks to restrict migration to cities by administrative control; and (*b*) the rural development strategy which, together with an urban development strategy through policies of location of industry, generation of employment, reduction of rural-urban wage rate disparities and other measures, seeks indirectly to restrict migration to the cities.

166. The first approach often interferes with freedom of movement and thereby dilutes fundamental rights, while the second approach, though logical, is difficult to administer as it calls for strong control of industrial location.

167. In spite of diverse attempts made by many Governments in the world, there are hardly any examples of successful efforts to stop the growth of giant cities or reduce their size. It has been noted:

> "Given these deep-seated and pervasive trends, there are scarcely any persuasive grounds for thinking that developing countries will prove more effective in coping with these problems. All the evidence suggests they have neither the administrative capability nor the resources, not to mention the will, to succeed in this extraordinarily difficult enterprise."[57]

168. Others have argued that:

> "... it is easier to steer the growth of large urban agglomerations by controlling employment rather than administrative restriction on the influx of new inhabitants. In reality, it is the only really effective way. Moreover, the alternative of administrative control over the settlement of new inhabitants within the city leads to some negative social phenomena, such as corruption of officials and a black market in housing."[58]

169. A number of students have emphasized the need to devote some attention to the development of medium-sized cities and small towns. There is general consensus on the formulation of comprehensive regional planning strategies, keeping in mind the concept of ecodevelopment, the purpose of which is to minimize environmental degradation. In the USSR, the five-year plan for 1971-1975 contains provisions intended to:

> "Steadily carry out the policy of limiting the growth of big cities; cease, as a rule, the accommodation in these cities of new industrial enterprises, except those connected with city service and urban facilities. Accommodate small enterprises with specialized production and branches of industries and factories functioning in larger cities and in smaller cities."[59]

Towards a new settlement system

170. Human settlement is the product of historical, geographical, social, economic, demographic and other factors, although purely accidental factors have sometimes influenced the location of individual settlements. In developing countries with feudal and colonial backgrounds, the settlement pattern is highly distorted, and there are striking imbalances between rural and urban development and a glaring lack of integration between cities and their hinterlands. In the developed countries also, the settlement pattern is distorted by the functioning of the market mechanism and profit motive which leads to imbalances of various types. Concern for environmental factors has been conspicuously lacking in the past in the pattern of industrialization and urbanization of the developed countries. The developing countries, however, could profit by the experience of the developed countries, and avoid wasteful patterns of industrial development leading to disastrous environmental problems.

171. The creation of a new settlement system is, therefore, an important objective for both developed and developing countries. In this difficult task, it is highly important to give the fullest consideration to environmental factors and to evolve a settlement pattern which minimizes environmental degradation and improves the quality of life. It is necessary not only to improve the tools and techniques of planning, but to broaden the planning horizon by bringing in the environmental dimension.

172. The relevance of social values should be particularly emphasized. It is not merely a question of evolving better planning techniques with "environment" thrown in as a new variable, but one calling for a re-examination of societal goals and life-styles both in

[55] United Nations Secretariat, Centre for Housing, Building and Planning, "Some issues relating to population distribution policies", *Population Debate*, vol. II, part five, para. 44.

[56] *Ibid.*

[57] Lloyd Rodwin, *loc. cit.*, para. 31.

[58] K. Dziewonski, "Comments on 'National policies and experiences relevant to urban development: an evaluation'", *Population Debate*, vol. II, part five, para. 6.

[59] A. V. Nevsorov, *op. cit.*

the developed and in the developing countries. Otherwise, it is likely that there will be, on the one hand, a large body of technical literature on the interrelationship between population, resources and environment; and, on the other hand, no effective implementation of environmental policies in the absence of a change in the attitudes and values governing society and political institutions It is, therefore, of the utmost importance that the gap between analysis and implementation should be bridged by a more unified approach to the problem giving the fullest thought not only to the socio-economic and environmental aspects, but to the political and administrative aspects

173. There is general agreement that a new settlement pattern is called for throughout the world to evolve more integrated and balanced settlements There are obvious difficulties in radically changing the settlement pattern, because spatial aspects, being the result of past trends, are fairly stable Any changes in the settlement pattern, therefore, must necessarily be slow and call for carefully worked-out long-term policies However, this should not mean that partial, tactical, short-term goals should be ignored Tactical aspects of the temporary, sometimes *ad hoc* and changing, short-term policies are no less relevant than the final strategy of an integrated and balanced system of settlement

174. While it is important to consider separately the problems of rural and urban development, a unified approach to the problem of human settlement must be emphasized For example, if curbs on migration to big cities are planned, it is important to realize that the process of migration has to be planned at both ends, in the countryside and in urban areas [60] The need for research on human settlement in order to formulate more effective policies for population distribution, resource utilization and improvement in the quality of life should be underlined While the need for strengthening local governments and ensuring fuller participation by the people at the local level in decision-making processes is to be emphasized, it is important to note that the challenge to humanity posed by the environmental crisis must be met at all levels—local, regional, national and international

Impact of technology on population

175. The impact of man on the ecosystem depends in large part upon the prevailing type of his social organization, the latter varying with the state of technology When the organization of society, considered as a variable or set of key variables, is included in the relationship of man, natural resources and environment, unlimited possibilities open up for different combinations of forms of development corresponding to varying states of equilibrium with the environment at different population levels The destiny of mankind is thus no longer determined linearly, but becomes a series of available options the concrete realization of which depends basically upon the will to effect change. The available options allow the developing countries, in particular, to select the paths that are best suited to their cultural values and at the same time allow them to achieve better harmony among natural resources, population and the environment From this point of view, science and technology acquire decisive functional value. Although they cannot themselves initiate social and political change, they are the basic tools for implementing it.

Technology as a cultural determinant

176 Technology, from an anthropological standpoint, is one of the greatest determinants of cultural forms If technology is not re-evaluated as a form of social expression, it will not be possible to build a new society In primitive societies, technology had two distinctive traits First, it was a simple process the elements of which were shared by virtually the whole of the community In this sense, technology forms an integral part of the individual and collective culture The second trait is that it was developed empirically without any connexion with a body of organized scientific knowledge The division between science and technology persisted without major change until well into the industrial revolution in the eighteenth century Then, gradually, the notion of technology became the privilege of a small number of countries and, within these countries, the privilege of a limited number of institutions and enterprises

177 For much of mankind and particularly the currently developing countries, technology has become an exogenous factor It must be emphasized that these countries of the third world which indiscriminately import or copy technologies are at the same time importing culture, habits, attitudes, values and the like, since, as a rule, the one is an inseparable part and determinant of the other In this way, the processes of change, even if successful politically, are frustrated in their ultimate objective of building a truly new society having values of its own This phenomenon arises, however, not because science is intrinsically an instrument of economic and social domination, but because the technologies that science generates and that are responsive to the purposes, needs and aspirations of the developed countries, are viewed as being predetermined by the "natural" development of scientific knowledge What is forgotten is the prime fact that, in most cases, the technological solution which a society adopts for a given problem is only one of many approaches that can be derived from existing scientific knowledge

178 The developing countries can, therefore, import technologies which can become an integral part of their culture and are capable of changing from an exogenous determinant into a legitimate mode of expressing their own values and aspirations This is obviously not the same as the si[illegible]istic [illegible] that all technology must be reinv[illegible] is to

[60] K Dziewonski, *loc. cit*

restore to a given society the power of decision-making over the use and purposes of technology. This demands invention in the broad sense; but in most cases, in the near future at least, it requires the adaptation of technological elements created in the more advanced countries to new conditions.

179. The notion of the "adaptation" of technology is understood to convey the meaning of incorporating a given product or process, *en bloc,* in an attempt to adapt it to the particular economic conditions of the recipient country, including the availability of manpower, capital, raw materials, market and the like. [61] A technology is the outcome of a combination of various elements belonging to one or more fields of scientific and technological activity. A different combination of elements may lead to a result quite different from what was originally intended.

180. A simple example is the heavy equipment used in building of infrastructure, such as roads or canals, in most developing countries. It is common in these countries to make considerable economic sacrifices in order to acquire costly equipment from abroad to perform this work. A paradoxical situation is then created, in which the owners of capital-intensive machinery reap the benefits which might have accrued to the local workers who now remain idle. A more realistic approach would be to design cheaper and simpler equipment which could be produced by local developing industry and which would serve to establish a capital/labour relationship better suited to the local conditions. No technological breakthroughs are needed for this; one needs only to use familiar technological know-how, but in a different way.

181. It is clear that in many areas of economic and social activity, adaptation is not enough; a great deal of original technological creation is needed. This is especially so in the case of problems which, being tied to the particular geographical and environmental conditions of developing countries, have not yet been investigated by the more advanced countries, as well as those problems which arise when hitherto unknown approaches and goals emerge in the process of social development. It is very difficult in many cases to distinguish between adaptation of a technology as defined above and scientific and technological research in the strict sense. These are approaches which in either case require imagination, creative capacity and a very lucid knowledge of and insight into the objectives and values of the given society.

Causes of technological dependence

182. Most of the countries of the third world have not made really significant advances in the matter of incorporating technology into their over-all social organization. Moreover, there is a growing scepticism about the very possibility of such an accomplishment. There are several reasons for this negative attitude. First, there is the objective finding already mentioned that even countries which have already transformed their socio-economic structures continue to model their technological solutions on the patterns set by the major advanced countries. Secondly, the creation of a domestic technological capacity is necessarily a long-term objective, while there are many problems in the backward countries which demand immediate solutions. In the circumstances, it is natural that a country should opt for ready-made technologies which save time even though they are not particularly suited to the ultimate objectives of that society. It is often considered that these solutions are suitable for a "period of transition", during which conditions will be created for a new and more original stage. However, the period of transition often ends by becoming well entrenched and by giving a permanent place to the principles and values which were originally intended to be temporary. The last, and perhaps the most significant factor, is the enormous prestige of technologies created in the great centres of world power. The complexity, sophistication and efficiency of these technologies give them the appearance of being the only possible answers to particular social demands.

183. The real problem arises when the scientific communities of the third world, taking the current structure of world scientific activities as the very embodiment of a "universal science", evolving more or less freely according to its own dynamics, transmit this view to the technologies which are derived from science, thus helping to make them sacrosanct.

184. Another departure from the situation prevailing in the more advanced countries is the shortage of "technologists" in the developing countries, i.e., those who connect the engineering professionals with the system of scientific research. It may be mentioned that in the developed countries, these technologists consist mainly of engineers working at the production level with a background in applied research and development. [62] It is this group, mid-way between production and scientific creation, that plays a decisive role in activating the appropriate feedback mechanism. In the countries of the third world, the engineers are generally of quite different background. If they take their training at home, as more and more of them are doing, they are generally trained in universities where research is inadequate and where the aim is simply to train professionals who are familiar with and able to make use of technologies developed in the advanced countries. Some of these engineers are sent abroad periodically by the firms employing them. Although much stress has been laid on the importance of such visits abroad, in reality, the vast majority of the engineers are sent merely to

[61] C. Cooper and F. Sercovitch, *The Mechanism for Transfer of Technology from Advanced to Developing Countries* (Falmer, Brighton, University of Sussex, 1970).

[62] A. O. Herrera, "The social determinants of science policy in Latin America", *The Journal of Development Studies*, vol. 19, No. 1 (1972); I. Sachs, "La science, facteur de progrès ou obstacle au développment du Tiers Monde?", *Problèmes économiques* (Paris), No. 1253 (1972), pp. 12-14.

learn how to handle new production processes and not to participate in their development On their return, they are confined merely to applying the techniques which they learned abroad and are given no opportunity to undertake truly creative work These various circumstances, and the almost total lack of applied research in local scientific activities, tend to produce among the technicians a strong bent to accept uncritically the technologies developed abroad, together with their concomitant systems of values and social organization

An independent technological development strategy

185. It is clear from the foregoing that, if the countries of the third world are to use technology as a form of self-expression, it is not enough to work on the scientific system alone. The primary objective must be to reverse current trends by seeing to it that their scientific and technological circles cease to act almost exclusively as receivers and transmitters of technologies developed abroad and become the legitimate and dynamic exponents of the aspirations and the creative capacity of their own societies This aim is, of course, very difficult to achieve.

186 The mechanism that once operated in the major countries of the West to establish a dynamic link between science and society no longer operates spontaneously in the developing countries. Even if the appropriate socio-political pre-conditions are created, it has been noted that the new society tends to inherit a certain rigidity because of the prestige which the established technologies enjoy within the scientific circle There is no single definitive strategy that can be adopted in order to bring about a change in this orientation Nevertheless, it is possible to identify some of the main problems and some of the possible courses of action. Specifically, with respect to the conduct and orientation of scientific and technological activities, two basic objectives may be mentioned: (*a*) to induce the community as a whole to participate actively in the process of developing technological orientations; and (*b*) to reorient the activities of the scientific and technological system so as to make it more flexible and receptive to the needs of society

187 To achieve these objectives, it is necessary to organize research on the basis of problems rather than of separate disciplines This means, first of all, to identify the problems or the research areas, which must be general and important enough to justify the formation of permanent research groups The identification of problem areas must be made with the participation of the researchers and in consultation with all representative elements of the community, such as government, institutions, trade unions and intellectuals Discussions should be broad-based and determine not only the problem areas themselves, but the general direction from which they should be approached. For example, it is not sufficient to identify "health" as a problem; it is also necessary to specify how the medical system is to be organized to meet the problem or whether it should be treated in a broad social sense.

188. The need for multidisciplinary research arises from the fact that there is practically no important social problem that does not require the help of such human and social disciplines as, for example, medicine, social psychology and economics Multidisciplinary research must be given a place at the stage at which problems are propounded, or, in other words, in the basic research phase and not merely in the individual project phase The gearing of research to problems, the participation of the community in defining them and in propounding the kind of solution to be sought, and the formation of genuinely interdisciplinary teams can be a most effective instrument for achieving dynamic communication between science and society It is undoubtedly a difficult mechanism to put into operation, and one that will take a long time to be really effective; but it involves the kind of activity that can be learned only by experience

Technology and ecodevelopment

189 This widening of the social base of scientific activities will certainly facilitate the adoption of those [illegible]

(*a*) making the fullest possible use of the specific resources of each ecozone, so as to satisfy the basic needs of its population while at the same time safeguarding the long-term prospects by managing those resources rationally instead of exploiting them in a destructive manner, (*b*) reducing adverse environmental effects to the minimum and, wherever possible, transforming waste materials into new products; and (*c*) devising technologies conducive to the attainment of these objectives [63]

190. Ecodevelopment is, first and foremost, an approach directed towards changing the traditional view of the development process It highlights the diversity of development options, the possibility of arranging for activities to complement each other so that residues and waste can be reduced to a minimum, and the need for greater reliance on domestic effort and on the originality of local projects The greatest change takes place in the technological style. The scope is not to be restricted to a small group of "soft technologies", nor to reject certain capital-intensive technologies where there are no appropriate and less expensive alternatives Instead of adapting the ecosystem to imported technologies, which have been tested under different ecological and cultural conditions and which tend to destroy the ecosystem with its disastrous social effects, the objective should be to adopt a new attitude and devise technologies appropriate to the conditions of the natural and social environment into which they are to be incorporated

[63] I Sachs, *Eco-development* Paris, École des Hautes Études 1973

191. Ecodevelopment also entails a change in priorities and in the style of scientific research. Instead of following the steps dictated by scientific centres abroad, researchers must adopt a different scale of values which would attach more importance to the solution of local problems, as well as to the simplicity of the techniques proposed, and to their evaluation from the ecological and cultural standpoint rather than solely in terms of their effectiveness for the purpose of achieving a maximum return. At the same time, great importance is attached to the participation of local people in research activities and an effort is made to take advantage of its knowledge of the ecosystem. [64]

Technology and local empirical knowledge

192. It is generally recognized that each society of the developing countries possesses a vast pool of experience, knowledge and imagination which can be of great importance in devising technological solutions appropriate to local conditions. The idea is to extract whatever original thoughts and approaches are available and to subject them to the kind of analysis that is possible through modern science. In view of the fact that a good many of the problems of developing countries have not adequately received the attention of international science centres because of the nature of the issues involved, consideration of local experience will lead to original approaches that may stimulate research in hitherto unexplored directions. [65]

193. A few examples will serve to illustrate the point. Where food is concerned, mention may be made of the following possible lines of work: selection of local plants and strains having a satisfactory productive potential; use of aquatic crops, in either salt or fresh water (the "blue revolution"), as a potential source of direct food or for the extraction of protein, possibly for human consumption and certainly for the feeding of fish. There is also the possibility of converting into valuable resources the aquatic plants which infest artificial lakes and which pose a threat of eutrophication; three-dimensional exploitation of forests for the extraction of wood, food for humans and fodder for livestock. In some ecosystems, this may be the best solution; adoption of agriculture at different levels, particularly in rainy tropical areas, showing due regard for the jungle landscape and even combining plants that have roots of different depths, different nutritional requirements and staggered periods of growth; extraction of protein directly from leaves and production of yeast in lignin; rational management of wildlife, which could supplement livestock production or even, as some biologists argue in connexion with East Africa, offer a more productive alternative. This also applies to marine fauna, as, for example, in the case of turtles; domestication of some wild animals, such as the guanaco in Latin America or the tapir in the Amazon area; selection of species native to similar ecosystems with a view to trying to acclimatize them (e.g., the Asian buffalo, instead of European cattle, for rainy tropical areas of Latin America); biological pest control.

194. The situation is somewhat similar in the case of housing. This problem has a number of interrelated aspects: the designing of population centres in harmony with the ecosystem, involving the construction of "ecological housing" by the use of local renewable resources and industrial wastes with labour-intensive techniques to carry out self-help construction programmes with the assistance of a few specialists. This may be one efficient method of coping with the world housing problem.

195. One of the problems that has received the least attention is the designing of population centres suited to the ecosystem and to local cultural traditions. Town planning continues to be, within the context of the Athens charter of the 1920s, a practice of reducing everything to a uniform design. In addition, much town planning is based on a geometrical view of space which completely ignores the features peculiar to individual cases and the many layouts that can be used. This is particularly striking in some tropical areas, where no effort has been made to give cities and population centres an original form adapted to their environment and capable of withstanding climatic changes (heat, torrential rainfall, tropical diseases etc.) through the appropriate arrangement of urban space, the utilization of plants as a protection against sun and rain, the use of biological methods for the treatment of waste water and so forth.

196. Although still inadequate, several studies have been made with a view to adapting housing construction to the climate and the natural environment. Here again, local experience can be especially valuable. In tropical areas of Latin America, the dwellings constructed by the indigenous population are more serviceable than those built in the European tradition and with European techniques. During the colonial period in Latin America, a type of dwelling very well adapted to the prevailing ecological conditions was constructed, but it has not had much influence on modern architecture. A recent Egyptian experiment in village planning, despite its failure, shows the tremendous potential of studying and rationalizing traditional housing design and construction techniques with a view to arriving at solutions that are efficient, inexpensive and in keeping with the tastes and customs of the local people. Yet, the cities of the third world are filled with cosmopolitan towers, and the rural population is being asked, in accordance with a false scale of modern values, to live in dwellings which in many cases are actually less comfortable, because smaller and less functional, than the traditional ones.

197. In every field of technology, there are innumerable areas where unprecedented solutions can be

[64] *Ibid.*

[65] E. Hobsbawn, *The Age of Revolution: 1789-1848* (New York, The New American Library, 1964); D. J. de S. Price, *Science and Technology: Distinctions and Interrelationships in Sociology of Science* (Penguin, 1972).

found through a more appropriate combination of modern science and technology and traditional empirical knowledge In order to facilitate and systematize this quest for new solutions, it would be interesting to explore some of the prevailing techniques "Morphological analysis" is one of the most promising of these It has been defined as "the technique of identifying, listing, counting and parametrizing the collection of all possible mechanisms with a view to achieving a specified functional capacity". It has the advantage of permitting systematic and exhaustive consideration to be given to all possible technical solutions of a given problem. This methodology has been used for a few very complex technological projects, but it could be of value in the quest for solutions in developing countries One of its advantages is that it helps to break up pre-established planning patterns, since one of its basic principles is that no solution can be rejected out of hand, even if at first glance it does not appear to be practical or feasible.[66]

RESEARCH

198. Gaps in knowledge and technology, on the one hand, and the desire to achieve rapid economic growth, on the other, have induced many countries to allocate part of their resources to research and development. In the developing countries, in particular, various views have been expressed as to whether emphasis should be placed on basic and theoretical research or on applied research. In view of the scarcity of their resources and the urgency of finding appropriate solutions to their problems, there is a widespread tendency to emphasize applied and development research in those countries. It is argued that basic research should be avoided when it is too abstract and theoretical, and offers no immediate prospects of application But it is also recognized that when the problem is to find unprecedented solutions in new areas, the theoretical approach is, in principle, the most appropriate method to use Theoretical research, moreover, requires relatively few material resources and permits full use to be made of brainpower, which is one of the few "soft" resources relatively adequately available to the developing countries

199 The magnitude, direction and nature of the changes that are likely to occur are equally important Efforts should be made to solve new problems as they are detected They may range, in the developed countries in particular, from the current decline in university enrolment in some scientific fields and the weakening of financial support for fundamental sciences to the prevailing concentration of research and development expenditures on military, space and other related programmes. It cannot be assumed that scientific and technical advances will continue at an adequate pace to solve man's most pressing problems unless tremendous research efforts are made.

200. As a general guideline, a number of suggestions for research considerations are offered below:

(*a*) The needs of developing countries should be given much higher priority;

(*b*) Much of the work pertaining to these countries will have to be interdisciplinary, cutting across traditional academic or scientific fields One example is research on agriculture in the humid tropics, where viable solutions can be found only by combining the efforts of agronomists, ecologists, and economists, to mention just three of several essential disciplines;

(*c*) The research should emphasize empirical and experimental work Choices among theoretical models and hypotheses will need a stronger base of data gathered through experimentation A number of suggestions might be considered for resolving specific problems, but in each case there is no way of knowing whether the suggestions will work without actually trying them out in the field Thus, for example, self-help or "no-cost" housing is a possibility that needs substantially more field-testing Similarly, the only way to determine whether an improvement in an individual's sense of security will induce him to have fewer children is to observe his behaviour when he is provided with such security. In recent years, a number of proposals to establish field experiments to test such ideas have been developed, and a few have been implemented to good effect. Such efforts need encouragement,

(*d*) Emphasis should be placed on projects suited for joint research efforts by both developed and developing countries In general, the developing countries do not have the scientists and the funds available to undertake all the necessary work required, at the same time, the solutions developed in richer countries are not always appropriate for poor countries Joint research efforts would facilitate the transfer of techniques and the development of new ones particularly suited to the needs of developing countries Several fields of research would appear particularly suited for this approach These include efforts to achieve greater efficiency in the use of energy, the development of solar and geothermal energy sources, forest management, research on factors affecting land use, integrated pest control, rural water-supply and waste disposal, the development of new materials for construction and manufacturing industry, and the development of ecologically sound technologies for less developed areas,

(*e*) In establishing research priorities in areas related to the improvement of human welfare and living conditions, priority should be given to those projects most likely to influence demographic behaviour in desirable directions This suggests, for example, giving priority to such areas as rural development, public health and new methods of primary and secondary education, on the assumption that improving and making more secure the conditions of life and

[66] Organisation for Economic Co-operation and Development, *Technological Forecasting in Perspective* (Paris, 1967).

providing new opportunities for people will make large families less necessary and desirable. This assumption needs empirical testing through the use of field experimentation;

(*f*) Population-influencing policies in the poor countries are not an end in themselves—their justification depends upon the contribution such policies can make to over-all social and economic development. Conversely, certain types of development policies, for example, policies to increase gross national product without regard to income distribution and the welfare of the great majority of the people, are liable to have little effect on average fertility in developing countries. Both empirical and analytical research are needed to find better ways of integrating development policies and population policies. Historical and comparative studies could be a powerful tool for this research;

(*g*) In problems of urbanization, much could be learned by placing greater emphasis on historical and comparative studies of the urbanization process in different countries at different times.

201. Some other specific areas of research and development that should be given more emphasis are listed below:

(a) *Population and resources:*

- (i) Surveys to identify and evaluate existing natural resources in developing countries;
- (ii) Problems of food production in the humid tropics;
- (iii) Methods of maintaining genetic variety;
- (iv) Methods of bringing about agricultural modernization;

(b) *Population and environment:*

- (i) Environmental factors in health, morbidity and mortality, and their economic and social effects;
- (ii) Ways to reduce the environmental impact of recovery, transport and use of energy;
- (iii) Environmental impact of the flow of population from rural to urban areas;

(c) *Population and settlement:*

- (i) New forms of human settlement, taking into consideration the modern revolution in communications;
- (ii) Primacy of metropolitan cities: its impact on regional welfare;
- (iii) The impact of high population density on the human environment: thresholds for external diseconomies;
- (iv) Effects of political and institutional framework upon urban development;
- (v) Comparative studies of the goals, instruments and efficiency of policies relating to ownership of urban land in countries with different socio-political framework;
- (vi) The relationship between alternative national, regional and intra-urban settlement patterns and:
  - *a* Rates of resource utilization;
  - *b* Disruption of the natural environment;
  - *c* Creation of pollution and congestion.

Conclusions and policy implications

202. The area of potentially arable land outside the humid tropics (where current technology does not allow more than subsistence farming for a small population) is about 2.4 thousand million hectares, 1 thousand million hectares more than the area cultivated today. The potential gross cropped area (cultivated area times the number of crops grown per year) is 4.1 thousand million hectares. With currently known technology and sufficient input—irrigation water, fertilizer, high-yielding seeds, plant protection, farm tools and machinery and farming practices based on modern scientific knowledge—this area of arable land could provide a satisfactory diet for from 38 thousand million to 48 thousand million people, from 10 to 13 times the current population of the earth. But most of the uncultivated land lies in areas of relatively small population; much is of poor quality and large capital investments would be required to put it under cultivation. In consequence, the best alternative for feeding the world's growing population lies in increasing the yields and the numbers of crops grown on currently cultivated land. This will require great improvements in agricultural technology, which in turn will depend upon the ability of a given country to produce industrial products and the ability of farmers to purchase these products from outside the farm. The basic requirement is creation of better conditions for market agriculture, in contrast to subsistence agriculture.

203. Agricultural modernization will depend upon over-all social and economic development as well as upon the growth, application and propagation of technological knowledge. Along with higher levels of industrialization, administrative and institutional organization are also required. Agricultural modernization in the less developed countries is one of the great challenges facing mankind. For future human welfare, it must take place much more rapidly than population growth, so that the level of living can be raised, and opportunities for improvement in the conditions of life can be broadened. The developed countries have a fundamental role to play in the first stages of modernization, because they possess a large share of mankind's scientific heritage and current ability to gain the needed knowledge through research.

204. Although the total fossil energy reserves in the earth are very large, rapidly rising energy costs and the uneven distribution of energy resources over the earth could be a very serious obstacle to agricultural modernization in the poor countries during the next decade. Two of the key ingredients—nitrogen fertilizers

and pumped-water for irrigation—demand large quantities of energy, about 0.4 calorie for every calorie of food energy produced

205. Known deposits of coal and lignite are sufficient to last for several hundred years with the population size and levels of *per capita* energy use projected for the year 2000. Much larger reserves of nuclear fuels would be available if breeder reactors could be safely developed. Use of thermonuclear fusion as an energy source and direct use of solar energy in electric-power generation and in other ways could provide sufficient energy for all conceivable human purposes over the indefinite future. A vast acceleration of research and development, with the objective of substituting coal and lignite for petroleum and natural gas, towards the economically practical use of thermonuclear and solar power is of the utmost urgency for the long term. In the short term, economies of energy use in the rich countries, to reduce the world demand for petroleum and natural gas (these countries now account for 87 per cent of the total world energy consumption), may be essential. Given current levels of technology and social, economic and organizational structure, current rates of energy consumption may not be able to continue for many decades ahead. Since such rates of consumption are difficult to change, the world may face serious problems in the future In this connexion, the Symposium on Population, Resources and Environment urged that "Conservation policies would help and should be promoted vigorously".[67]

206 There has been apprehension that world resources of metals and other non-fuel minerals are being rapidly depleted by the lavish use of these substances in the rich countries. These anxieties appear to be groundless for the most important metals, if past rates of technological improvement in the mining and processing of metal ores can be sustained. Besides these improvements, four other courses are open: (*a*) reduction in consumption; (*b*) exploration for and discovery of new deposits; (*c*) recycling; and (*d*) substitution of other more abundant materials Only the third and fourth alternatives can be relied on with some degree of confidence for the long term. But these, as well as the other alternatives, will involve increased uses of energy. At bottom, in fact, the solution of all resource problems, including problems of environmental deterioration resulting from resource exploitation and use, depends upon mankind's ability to obtain and use sufficient energy; and this, in turn, depends considerably upon research and development of new energy technology In this connexion, the Symposium urged Governments to:

> ". . . redefine development goals so that increases in material consumption cease to play the most central role Emphasis instead should be put on widening the range of social and cultural services, so as to achieve a less resource-intensive and environmentally disruptive development profile Such a shift would require changes in the pattern of society, including a drastic reduction of inequalities, and institutional changes."[68]

207. The ultimate limits on human activities and numbers set by the so-called "renewable resources"—air, water, land, and living plants and animals—are probably more critical than those from resources of fuels, metals and other minerals The finite area of the earth means that space on the earth's surface itself could eventually become scarce, and hence a resource about which choices would have to be made Already in various regions of the world, serious shortages of some resources are evident Fresh water and agricultural land, though still abundant for the earth as a whole, are almost fully utilized in many densely populated countries, and this is also true of forests and fisheries. Some of the reasons for this include uncontrolled and irrational use of resources, absence of appropriate global, regional and national policies; inadequate socio-economic institutions and unsound biological and technological practices, as well as increasing demands resulting from population and economic growth For the future welfare of mankind, it is critical to determine what the limits set by renewable resources may be and to find ways to approach these limits, if they exist, gradually and asymptotically, rather than exponentially and catastrophically.

208 Several writers have suggested that the possible limitations set by renewable resources are currently being aggravated by the increasingly evident environmental deterioration, especially "the pollution of affluence" which has emerged during the past 30 years in the rich countries In these countries, the growth of environmental deterioration depends primarily on increases in gross national product and the use of environmentally destructive technology At the same time, the degree of abatement of environmental deterioration is determined by the people's perception of environmental hazards and their ability and willingness to allocate resources for maintenance of environmental quality. Both of these depend upon *per capita* incomes and upon the costs of abatement The latter decrease with time, due to technological improvements and economies of scale. Population growth is of only minor importance in causing environmental deterioration in the developed countries; but the total impact of deterioration on the population, which is the sum of the impacts on individuals, varies directly with population size and the distribution of population in relation to the areas of deterioration

209. On these considerations, a set of policies can be evolved in order to contain and reduce the impact of environmental disruption. It might then be considered whether it would be most appropriate to try to lower the quantity of waste products, or the envi-

[67] "Report of the Symposium on Population, Resources and Environment", Stockholm, 26 September-5 October 1973, *Population Debate*, vol II, annex II, para 22 (*d*)

[68] *Ibid*., para 22 (*o*)

ronmental deterioration caused by wastes entering the environment, or the impact of this deterioration on the population.

210. The quantity of wastes produced for a given level of GNP depends upon the structure of the GNP and on the technologies employed in the production and consumption of materials. Process changes in industry can be applied to recycle and re-use waste products, and technological changes in consumption can be made (e.g., motor-car modifications to lower the release of nitrogen oxides and unburned hydrocarbons) to ameliorate the situation. In altering the structure of GNP, the aim should be to allocate larger proportions to services and industries such as electronics which use relatively small quantities of material resources.

211. Deterioration caused by wastes entering the environment can be reduced by locating waste-producing activities in areas where the absorptive capacity of the environment is relatively large. For example, industrial air pollution will be much lower in a region of infrequent atmospheric inversions. Water pollution will be much less likely if waste-producing industries are not concentrated around a few water bodies. The effect on the environment will be lessened if the wastes can be dispersed over a large area or released in a location where they can be diluted by a large volume of water or air, for example, a sewage outfall located in the ocean several miles from shore. Construction of dams to maintain a relatively uniform river flow throughout the year will increase the volume of water available for waste oxidation during the dry season. Another measure for lowering environmental deterioration is the treatment of waste products to transform them into chemically and biologically innocuous materials, as in modern waste-treatment plants.

212. The impact of environmental deterioration on the population can be lessened by locating environmentally polluting activities in areas of low population density—for example, a green belt around an airport will limit the impact of noise pollution to only a few people—or by locating these activities down wind or down stream of population centres. Alternatively, the population can be protected from environmental hazards, for example, by innoculation against water-borne diseases such as typhoid, or by the provision of protective clothing to industrial workers in areas of radio-active or chemical danger.

213. In the developing countries, in contrast to the developed ones, the rate of population growth must be taken into account directly as a cause of environmental deterioration, in addition to the rate of growth of gross production, urbanization and the effects of technological change. Rapid population growth in the poor countries directly influences environmental deterioration in a number of ways:

(*a*) The intense efforts of the rural population to raise food production to feed their rapidly growing numbers often result in attempts at cultivation of previously marginal lands, speeding up the cycle of swidden (slash and burn) agriculture, destruction of forests, dispersal of inadequate supplies of irrigation water over larger and larger areas, and over-grazing of pasture lands. The common consequences are soil depletion and disastrous erosion;

(*b*) Population growth is one of the major causes of the high rates of concentration in the cities. This crowding into cities proceeds more rapidly than the ability of the city dwellers to make the increasingly high *per capita* expenditures on urban infrastructure that are needed for protection from the environmental hazards caused by their growth in numbers. In high-density urban slums and squatter settlements, the water-supply and waste-disposal systems are usually inadequate, and the rate of production for highly infectious human wastes is raised beyond the capacity of the soil and natural drains to absorb them. The dangers of infection from water-borne diseases are increased because more people use the same common water sources;

(*c*) In rural areas, the quantity of water available for domestic use is often limited. Increasing water needs, caused by population growth, may approach or exceed the limits of available supply, with the result that personal hygiene and sanitation deteriorate and diseases multiply. Waste-disposal problems are also becoming intensified in the rural areas of developing countries, because of rising man-land ratios, growing use of pesticides and chemical fertilizers and increasing consumption of surface waters for irrigation, which reduces the quantity of water remaining for other uses.

214. Besides the improvements in the health of population from control of infectious disease, numerous social and economic benefits would result. The following deserve greater consideration in economic and social planning:

(*a*) Reduction of food requirements and costs by lessening the malabsorption caused by intestinal parasites;

(*b*) Increases in potential economic productivity through improved health of adults;

(*c*) Greater receptivity of children at early ages by improvements in health.

215. Environmental questions are assuming increasing importance among the social and economic policy objectives of most countries, both developed and developing. The relationship between population distribution and physical environment is more satisfactorily dealt with at the aggregate level, in the sense that it is not clear that alternative settlement patterns will have significant differential effects on the environment. The degree of population concentration may indeed have impacts on the urban environment and quality of life; but it is argued that attempts drastically to alter settlement patterns are inappropriate, even if feasible. To the extent that any spatial alteration is desirable, planned decentralization within a poly-

nucleated metropolitan area is more feasible than diverting population to smaller, distant urban areas

216. Views have been expressed that particular population settlement patterns could minimize the strain on environment. However, apart from the fact that low population and industrial densities would reduce adverse environmental impacts due to concentration, the thesis cannot be satisfactorily defended because its policy implication is unrealistic Since spatial economies of scale exist, the benefits of concentration have to be assessed along with the costs More idealistic strategies have been advocated, such as the redistribution of population into small well-defined clusters.[69] These population resettlements would not essentially reduce the demand for natural resources or its accompanying environmental degradation, unless they were accompanied by radical, and as yet unknown, changes in technology, many of which may be implemented without drastic changes in population distribution

217. In countries where population is growing rapidly and the national urban hierarchy is not properly evolved, as is the case in most developing countries, policies of particular kinds may have considerable influence on the settlement pattern Housing policies, social infrastructure investments and decisions on physical planning are only a few of those influencing the locational behaviour of the population In the advanced developed countries, with a high degree of urbanization and a low rate of population growth, settlement patterns appear to be more stable. The choice of a policy should depend upon the inherent characteristics of a given country—its institutional structure, level of development, rate of growth, environmental disruptions, existing urban structure, demographic characteristics etc.

218. Urban size strategies and aggregate population policy differ in that measures for the former are directed essentially towards migration, while the latter concentrate on reduction of fertility. Despite the significant importance of migration in differential urban growth, few countries are prepared to adopt migration subsidies and controls as proper instruments In general, the level of migration subsidy ought to be high enough to counteract the pull of market forces towards large cities Efforts have often been made to influence migration indirectly by subsidizing the creation of jobs and employment at specific locations in order to divert migrants from their preferred settlement. This strategy is based on the assumption that employment opportunities are the main determinants of migration.

219. Urban size strategies have had both failure and success, and there have been very few co-ordinated attempts to influence the size distribution as a whole rather than acting on specific size ranges (e g., controlling the largest metropolis, growth centres and new towns, agricultural marketing and service centre strategy) Too little is known about the effectiveness of various instruments However, for the control of big cities, there is scope for both prohibitive controls (e g , land use controls, factory licences) and pricing policies (e g , payroll taxes, pollution charges, congestion taxes) Since many national and regional policies (e g , agricultural policies, fiscal policies, industrial strategy) have indirect effects on urban size, their influence should be taken into account For many urban problems (e g., pollution) technical solutions and pricing strategies are more effective than size control measures

220 Apart from the limited effectiveness of urban policy, a more important question is that of the scope for a national urban size or national settlement pattern policy The solutions to many so-called "urban problems" (e g , poverty, psycho-social stress, crime) are not to be found in altering the national settlement pattern These are problems present in cities but not caused by cities, and, in the main, national urban strategies are not capable of solving general economic and social problems Many goals may be relevant to a national population distribution policy, but changing the distribution of city sizes is too broad a strategy for dealing with a set of multiple and occasionally conflicting goals There has been no evidence to indicate that a more even size distribution of cities implies either greater efficiency or higher welfare than a skewed distribution

221 One component of national urban policy that has received widespread application is a growth-centre strategy The objective here is to increase the size of urban centres, particularly in lagging regions, to a level at which development becomes self-sustaining. Growth-centre policies are reflected in different ways The size of growth centres may vary widely according to whether the aim is to develop rural service centres, to articulate a polarized spatial strategy for regional development or to promote countermagnets to a major metropolis

222 A number of countries in different parts of the world and at different stages of development (e g , France, Turkey, the United Kingdom, the United States and Venezuela) have attempted to devise effective policies and strategies to guide their urban development At first, their Governments dealt with components of the problems, such as housing, industrial location, transportation, recreation and education. Later, they became concerned with the more basic problems of suburban growth and the relationship between metropolitan regions and central cities. The problems of poverty and lagging regions also came to be treated as specific components of the larger, more complex problems of managing the economy

223. On the basis of the similarities and differences in the experiences of growth strategies and the factors that will shape such strategies in the future, a few cautionary propositions for policy have been formulated

[69] See "A bl [illegible]

(*a*) For the next generation, it is probably not feasible in most developing countries to stop the spread or the growth of giant cities, but it may well be feasible (and desirable) to lower their rates of growth in relation to the growth rates of other urban centres;

(*b*) Fostering big cities is one of the best means of countering the growth of giant cities;

(*c*) New towns and expanded towns should serve, rather than ignore or frustrate, the basic aims of settlement strategies;

(*d*) If a policy of decentralization is pursued, the choice of regions is of critical importance and should be related to the goals, constraints and development opportunities, with special concern for equalization and spread effects;

(*e*) Although encouraging decentralization in large cities may be a reasonable policy given the current state of knowledge, it is politically defensible only if there are appropriate complementary efforts to assist other problem regions;

(*f*) National strategies for urban development will be seriously handicapped until the resources and capabilities of local government are greatly strengthened;

(*g*) A basic question confronting urban development strategies is how to ensure that the groups which should benefit from growth will actually do so.

224. A new, more integrated and balanced settlement pattern is called for all over the world. There are, however, obvious difficulties in changing drastically the settlement patterns. These changes are necessarily slow and they call for carefully worked-out long-term policies. Partial and tactical short-term objectives should also be considered, since tactical aspects of short-term policies are no less relevant than the final strategy of an integrated and balanced system of settlement.

225. The preoccupation with urban environmental disruption has detracted from the urgency of environmental problems in rural areas, particularly in developing countries. Floods, deforestation, soil erosion, absence of clean water and inadequate public health facilities are only a few examples. In order to be able to formulate appropriate policies, rural-urban migration and the urbanization process should be carefully studied. There has been a tendency to ignore the positive role of migration strategy in relieving rural poverty in developing countries. No matter how bad the situation is found to be in the cities, it is unlikely that large-scale migration would be occurring if conditions were not still worse in the countryside.

226. The success of policies designed to slow the rate of urbanization in developing countries depends to a large extent upon the ability to stimulate rural and agricultural development. In many developing countries, a prerequisite of the improvement of rural and agricultural modernization and development may be more equitable distribution of land. To the extent that land reform succeeds in giving land to the landless agricultural workers, it may also have a favourable impact on fertility. One cause of rural-urban migration in most of the developing regions is economic and social stagnation in rural areas, as manifested in the high differential between rural and urban wages, the drab and unexciting social image of rural life and the absence of public services. Rural development will no doubt lead to some lessening of rural out-migration, but it must be realized that, with increased labour productivity in agriculture, there may be a new impetus to migration from the countryside to the cities. This would call for a suitable national strategy to obtain a better balance in settlement patterns between urban and rural regions.

227. Findings of studies suggest a sharp reduction of migration streams from the rural areas under the impact of the green revolution. But the green revolution has also been accompanied by many side effects at social and ecological levels. At the social level, it has polarized rural population by favouring a limited group of rich farmers who have access to water, capital and new techniques, and has led towards mechanization, hence aggravating the problem of unemployment in the developing countries. At the ecological level, it runs into a threefold problem: the elimination of genetic diversity with the risk of increased vulnerability to plant disease; excessive use of water; and ever-increasing use of synthetic fertilizers and insecticides.

228. The efficiency of individual cities in providing for human needs may depend more upon their internal organization and structure than upon population size policy. The strategy for controlling land use, for example, plays an important role in the internal organization. It is being recognized that the distribution of income, wealth, housing and social services is greatly influenced by the way urban land is allocated and used. Public policies should, therefore, on welfare grounds, provide sufficient control over land and give priority to land use that contributes to the needs of the majority of the population.

229. Housing absorbs a large fraction of the capital invested in cities. It should not, however, receive a large share in the developing countries. The needs of the majority of the population are for employment and essential services, such as transport, water-supply and waste-disposal facilities, and only secondarily for housing. The concept of "low-cost" public housing has proved to be inadequate, since it often involves capital-intensive, permanent dwellings of brick or concrete which are not essential in tropical countries and often turn out not to be "low-cost" to the urban poor. A more useful concept is that of "no-cost" housing, according to which the poor are provided with improved land, water and sewage facilities on which they would construct houses with materials they could afford. The provision of technical assistance and some materials by public authorities may be considered useful policies. An important secondary beneficial effect of this approach is the fact that it is likely to absorb

substantial amounts of otherwise unemployed labour during the construction phase.

230 The connexion between population trends and

turn has contributed to high levels of unemployment and other social problems in many developing countries These problems were often aggravated by attempts to apply and adapt technologies not suited to local conditions, for example, capital-intensive technologies in capital-scarce, labour-abundant countries, or the application of temperate agricultural techniques in tropical areas

231. High priority should be given to those technologies which tend to improve current and prospective imbalances between population and food and other resource requirements Apart from the immediate need for further efforts to limit fertility, the introduction of labour-intensive technologies that do not require excessive sacrifices in productivity, and of patterns of production that encourage fertility decline should become central considerations in development planning Such production patterns should include concentration on mass markets that provide an incentive to control family size, and the organization of production to maximize the employment of young women

232. The mechanism that once operated in the developed countries to establish a dynamic link between science and society no longer operates spontaneously in the currently developing countries Even if the proper socio-political conditions could be produced, the new society tends to manifest a certain rigidity because of the prestige that the established technologies enjoy within the scientific circle. Therefore, economic, social and technological improvement of the developing countries cannot be achieved by merely following the historical development path of advanced industrialized countries New societal objectives must be defined, within which appropriate technologies in harmony with local conditions should be specified The new strategies should also be ecologically sound, giving due consideration to the problem of environmental deterioration.

233. The new concept of the assessment of technological development arose when it was realized that technology can be the source of both benefits and undesirable effects Governments continue to favour technological innovations as suitable strategies for maintaining full use of available resources and sustained economic growth They are also taking appropriate steps to reduce the harmful effects of technology and to control and direct new technological innovations towards socially desirable objectives

234 One consideration in assessing technology is that it should be in the public interest and maximize the net gain to society (general welfare) Another consideration is to examine where the burden of uncertainty would fall when the costs and benefits of a contemplated action cannot be clearly assessed No major technology should be allowed to expand for long without the gathering of empirical evidence on its possible harmful effects and on the relative merits of alternatives. The experience with certain pesticides illustrates that although they have prevented deaths from starvation, they have also inflicted unintended but widespread losses on fish and wildlife, and it is increasingly suspected that they are harmful to man There have been suggestions that carefully designed experiments in the early days might have influenced the technology of pesticides before the current stage was reached at which significant alteration of technology has become extremely difficult On these considerations, the evaluation and assessment of the probable effects of technology have been emphasized by most scientific communities. Proposals have been made, for example, to earmark from 1 to 5 per cent of the budget of each technological research project for the assessment of its consequences

235. The achievement of a better system for assessing technology faces major obstacles. Society is

Analytical tools being primitive and crucial knowledge often missing, it is difficult to know how to provide quantitative assessments of such goals as a clean environment and the preservation of future choice In principle, technology is a major factor which contributes to the achievement of societal objectives. Technology can thus be considered a dependent variable in the decision-making process. Defining the objectives of society is then the first step towards a logical grouping of actions in the socio-economic field and subsequent technological need

POPULATION AND THE FAMILY *

Report of the Secretary-General

THE FAMILY AND SOCIETY: SOME HISTORICAL PERSPECTIVES AND DEFINITIONS

Family type

1. In almost any discussion about a social unit, a community or even a country, the family will inevitably be spoken of as one of its basic institutions. Such statements as "the family is the natural and fundamental group of society" are frequently put forward as axioms rather than as propositions to be argued. Yet when an attempt is made to define the precise role of the family in a given society, the situation becomes much more complex.[1] Indeed, the problem begins with the definition of what a family is, and, despite the growing complexities of the family in the modern world, it may be easier to define the basic family unit in contemporary societies than it is with respect to the historical past.[2] One theory would say that society began with the allocation of social roles to the members of the nuclear family and has developed through the extension of roles to the extended family and to wider kin groups. As society grew in complexity from the hunting stage to larger and more settled communities based upon group dwelling and economic as well as social roles, the family tended to lose some of its predominance, in the sense that it became merged into a wider society which gradually emerged as a city or a state or eventually as a nation, the last being the current universal appellation for a self-contained political system.

2. In the complex world of today, many States have within their borders family systems that can be defined as biological (or nuclear) or extended (or stem), and there is still a considerable body of opinion that attaches the characteristics of one or the other of these to a particular country as the dominant type. Thus, the United States of America is often referred to as a country in which the fundamental family pattern is the nuclear or biological type.[3] These broad definitions are often thought of as being more appropria phase of pre-industrialization and to the phas level industrialization, respectively. Yet histc dence is giving increasing support to the viev essential family unit has long been the bio nuclear variety; and that, when viewed in members of households residing together, the variation of size, whether among the countri contemporary world, or among societies bacl has been much less than has been generally re None the less, there would probably be very li ment against the view that in pre-industrial an societies (the roles of) grandparents and kin, not necessarily residing in the same househol more clearly defined role and were of grea import to the nuclear group of parents and than is the case in modern industrialized societi major responsibilities for the socialization of and for the welfare of parents when they hav their basic economic functions as breadwinn with the State rather than with each kin group the latter is among the major functions of comprehensive social security systems.

Socio-economic change and the family

3. It is probably no exaggeration to say of the more dominant features of national today is social change. In the more indus societies, where average *per capita* incomes tively high, social change is associated with, a some extent a reaction to, the very rapid an erating rate of technological innovation, par over the past 25 years. In the less developed s where average *per capita* income is markedl technology has also been important. Probably standing factor, however, has been technology rather to the communication of ideas than tc industrial reorganization and mobility. Neve there are few national societies which have not impact of social change in major ways; an changes have reacted upon family and kin grou for centuries past, have formed the basis of organization.

4. Modern societies, viewed from the persp of social and economic differentiation, may be

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* For the report of the Symposium on Population and the Family, Honolulu, 6-15 August 1973, see *Population Debate*, vol. II, annex III.

[1] For definitions and discussions of family types, see Irene Taeuber, "Change and transition in family structures", in Arthur A. Campbell and others, eds., *The Family in Transition*, Fogarty International Center Proceedings No. 3 (Washington, D.C., Government Printing Office, 1971).

[2] Steven Polgar, "Cultural development, population and the family", *Population Debate*, vol. II, part six.

[3] I. Taeuber, *loc. cit.* It is certainly true that the nuclear or biological family is the predominant type in the United States of America. In 1960, 92.4 per cent of white families and 83.5 per cent of non-white families, defined by place of residence, consisted only of parents and their children. A simila nance of the nuclear family is almost certainly true o other countries, particularly of western and northern and Europe-overseas.

have originated when man left the hunting-gathering stage and began to concentrate on agriculture [4] So long as subsistence was the dominant element of economic organization, the social system, although often controlled by elaborate customs and mores, frequently of great subtlety, was nevertheless much simpler than the systems of most societies of the contemporary world The dominant political unit today is the nation, and although the daily life of the inhabitants of many nations may still be built essentially round a subsistence economy, few of these peasants are immune from contact with and obligations to the wider national society, and, in reverse, that national society has tended to assume obligations for the well-being of the subgroups which together comprise the nation Indeed, one remarkable feature of the modern State is its size, both in terms of the geographical region that may be covered by a single political system and also with respect to the vast numbers of people involved. An example of a national society of dimensions already beyond numbers of any previous political system is India; and although Indonesia is still small by comparison, its rate of growth is such that it must soon more than double its numbers and join the ranks of the giants. Great size is not limited to the so-called "developing world", however, but is also typical of some of the highly industrialized countries, such as the Union of Soviet Socialist Republics and the United States of America.

5 This tendency towards "mass" society, defined as a group of people owing allegiance to a common political system, is undoubtedly one factor tending to bring about increasing uniformity in basic social institutions A significant feature here is the fact that while the majority of the population of many countries do not themselves move from their traditional areas or have direct contact with cultures outside the boundaries of their own nations, or even outside the boundaries of their own regional subsystem, those who direct the political and social affairs of nations can be and frequently are almost continuously in contact with each other, either in person or through the flow of ideas now possible with modern communications

6 In all such mass societies, the network of communications, responsibilities and obligations extending downward from the political unit of the nation through regions, communities, households and individuals is extremely complex; and the capacity of the household and nuclear family to adapt to these changing conditions and pressures remains an essential element in mass society.

7. There are, of course, still many deeply rooted and culturally significant national, regional and community differences with respect to family formation and structure.[5] These include rules and customs regulating such matters as choice of marriage partners, age at marriage, roles of parents as concerns the maintenance of household and family, rules relating to the dissolution of marriage, rights of inheritance, and children's obligations to parents, to name but a few. Overriding all these differences, however, seem to be the pressure towards a set of universal standards and obligations that has accompanied the rise of the national State These standards and obligations are in turn, it would appear, associated with the major driving force of every national Government, that is to say, the improvement in the "welfare" of its citizens Again, concepts of "welfare" are themselves varied and are determined by different systems of political philosophy, of economic organization and of social rules, but there appears to be one feature that is now universally accepted, namely, the right to long and healthy life and to adequate [illegible]

Demographic change and the family

8 Concern with matters of life and death has, of course, long been a major element of social and family organization, but when in the eighteenth century mass societies began to gain apparently permanent control over major killing diseases, thereby widening the gap between the force of life and the force of death until the expectation of life at birth rose from 35 years or less to 70 and more, the family began to be associated in an entirely new way with the population issue As mortality has fallen, the family unit has increasingly responded by finding new ways of bringing its own growth rate under control by reducing the numbers of children born There is growing evidence that considerable variation in fertility existed well before the long-term trend in mortality began,[6] but mass society had never before experienced the permanent abolition of the main infectious diseases nor faced the demographic consequences that would flow from this development unless new patterns of reduced fertility could also be evolved. The revolution in fertility patterns is not yet a universal phenomenon: it still applies essentially only to countries fortunate enough to have achieved a substantial reduction of mortality, sufficient to guarantee an expectation of life at birth of 60 or more years. It is also probably true, however, that one of the universal ambitions of all Governments in countries where such mortality gains have not been made is to achieve a life expectancy of this length Thus, the family has become deeply involved with this universal goal and thereby with the population issue, and even in countries with life expectations beyond 70 years, major public investments still are made particularly for the purpose of reducing both infant and geriatric mortality in order to prolong the expectations even more.

9. In this latter case, further economic development is not necessary to sustain these extremely low levels of mortality. Indeed, some argue that the quality

[4] S Polgar, *loc. cit*

[5] Moni Nag, "Socio-cultural patterns, family cycle and fertility", *Population Debate*, vol II, part six

[6] See, for example, Peter Laslett, *Household and Family in Past Time* (Cambridge, Cambridge University Press, 1972).

of life might be improved with a measure of redevelopment.[7] But in the case of those countries where life expectancy is still about or under 50 or 55 years, premature death is still attributable to malnutrition caused by inadequate food-supplies, inadequate housing and public health systems, poor water-supplies, the prevalence of infectious but controllable diseases, and so on. In other words, greater economic and social development is another universal aim, and again the developmental goals have major impacts upon the family through the introduction of new technologies, particularly in food production, through increased migration of people towards cities and towns in search of non-rural employment and through the development of new educational facilities to enable the rising generation to acquire the necessary literacy and occupational skills appropriate to the new technologies.

10. As the processes of development increasingly reshape society, the more the mortality declines generated by development tend to accelerate population growth, and the more new pressures are exerted upon the family to adjust its own size and structure to the rapidly changing society of which it forms a part. According to one scholar:

> "The setting of high mortality, high fertility, and slow changes over time has been the modal one among earth's people until quite recent times. If favourable economic and environmental conditions permitted reductions in mortality and the generation of growth, expansion areas were generally available at near or reachable distances. If fertility were at lower levels, functional associations of fertility and mortality permitted both more efficient reproduction and less burdensome family structures. If mortality and fertility declined over time to reach low levels, there were the historic transpositions in population and family . . . . If mortality declined over time with fertility largely intact at traditional levels, there were increasing rates of population growth, increasingly long survival of spouses, and increasing numbers of surviving children per couple. Given traditional rules of family formation and retention, average family size would mount swiftly and increasingly acute pressures would be generated in the still dominantly rural population. In an assumption of unchanging fertility and intact rules of family intrusion and exodus there is an implicit assumption of limited economic development and slight social change. Hence the mounting pressures would characterize urban (as well as) rural peoples and the possibilities for the reduction of rural pressures through urban exodus would be muted."[8]

11. This is an apt description of the current demographic crisis in less developed areas as it is manifested at the family level. A major objective of the development strategies of these areas is to break out of these historical constraints—a process that will indubitably change the structure and role of the family, but has shown no sign of weakening it as the fundamental base of social organization.

Population trends and the family

Variations in family size

12. The most significant fact in respect of policies concerning population and the family is that the demographic situations in almost all regions and countries of the world have major unique elements with historical explanations. The most simple typology in general use to illustrate these aspects is the division of the world into "more developed" and "less developed" regions. This dichotomy may be identified in a number of different ways: for example, by reference to areas in which the population displays a substantial level of planned control over fertility compared with regions where essentially "natural fertility" prevails. The dichotomy has been expressed in terms of gross reproduction rates (GRR) of around 2.0 or less for developed countries and higher for developing countries, but there is evidence that the measure may now be closer to a GRR of 1.5. The distinction may be in terms of life expectancy between approximately 38 and 55 years among the less developed regions, though Mexico is an exception with an average life expectancy at birth of 60 years. Again, a classification could be made by *per capita* income, with the less developed regions having incomes ranging downward from $500 per annum.

13. Such a classification suggests that levels of fertility and mortality are determined to a considerable degree by such factors as nutrition, the efficiency of health services, the application of medical science to the elimination of infectious and parasitic diseases, literacy, the spread of technology which provides a basis for industrialization and modern systems of communication, and the availability of the knowledge and means whereby individuals and couples can limit the size of their families, if not strictly to the levels they may desire, at least to levels that fall considerably below "natural fertility".

14. There is not and has not been over at least the past 2,000 years of human experience any society that has displayed fertility patterns consistent with human fecundity, that is, with the physiological capacity of females to reproduce. In other words, societies have always applied social constraints, generally more in the interest of cultural and social organization than in the interest of the individual parent or family.[9] Throughout most of human history, these contraints have helped

[7] For example, Paul R. and Anne H. Ehrlich, *Population, Resources and Environment: Issues in Human Ecology* (San Francisco, Calif., Freeman, 1972).

[8] I. Taeuber, *loc. cit.*, pp. 45-46.

[9] Moni Nag, *loc. cit.*; and Maurice Godelier, "Quelques remarques théoriques, sur les rapports entre famille, population et société" (E/CONF.60/SYM.II/10), paper submitted to the Symposium on Population and the Family, Honolulu, 6-15 August 1973.

to keep populations within the bounds of subsistence Without such constraints and in conditions of maximum health, it would be possible to envisage a situation in which females exposed to the risk of pregnancy over the full span of their reproductive lives, averaging around 30 years, might produce an average of about 15 children. Such a figure has never applied because such constraints as rules concerning the minimum age of marriage, the disruption of marriage through widowhood, customs preventing remarriage and constraints relating to intercourse following the birth of children have always lowered fertility considerably below maximum fecundability. One of the highest fertility levels that has ever applied to a society with statistical records is that of the Hutterite communities of North America, which, at their maximum fertility levels, produce an average completed family size of 10 6 children[10] A figure exceeding eight children has also applied to the Cocos Islanders and other small populations Completed family sizes of around seven children appear to apply today in a number of communities in tropical Africa, and figures of five or six children are common through the majority of the countries of the less developed regions of the world

15. Compared with this, the range in completed family size of most of the more developed countries of the world is significantly more homogeneous, being about 3.0 children It is usual to regard these latter societies as having completed the demographic transition, that is, as having evolved from a situation in which there was little or no individual initiative to influence family size (i e., total number of children born alive to women who have completed the reproductive span) to one in which there is deliberate planning by individual parents to produce the number of children thought by them to be desirable. In other words, the family size of more developed regions is seen primarily as the product of rational control exercised by individual parents rather than as the passive acceptance of fate, the attitude in many societies. In developed societies in recent times, the average number of children born to each married woman by the end of her fecund years has been 3.0 or fewer. The extent to which this level of married fertility is above the level required for replacement of each generation depends upon the level of mortality and the proportion of females married These matters are considered below in more detail (paragraphs 55-100); but it may be noted here that among the more developed societies, mortality is no longer a significant factor in determining the number of children required for generation replacement, since most female children survive to the end of their reproductive years.

[10] See J W. Eaton and A J. Mayer, *Man's Capacity to Reproduce The Demography of a Unique Population*, (Glencoe, Illinois, Free Press, 1954), and A J Coale, "The demographic transition", *Proceedings of the International Union for the Scientific Study of Population*, International Population Conference (Liège, 1973) vol I, pp 53-72

16 In situations where the expectation of life is between 70 and 75 years, approximately 95 per cent of children born will live to complete their reproductive lives A more significant factor determining a demographic situation in which fertility may be above or below generation replacement in such developed societies is nuptiality, which also is considered below in more detail

Trends in the more developed regions

17 During the 200 years preceding the Second World War, the family patterns of the "more developed" societies displayed a number of aspects which acted as considerable constraints upon their growth rates The first was, of course, relatively high levels of mortality, with life expectancy before 1850 ranging from only about 35 to 40 years Thereafter, this constraint weakened, and expectation of life at birth reached figures of between 55 to 60 years by the beginning of the twentieth century Since then, it has continued rising steadily to ceilings between about 70 and 75 years as the average of both sexes, with figures for female life expectancy at birth of between 72 and 77 years

18 A second constraint among most of the countries which have now become "more developed" has been a relatively high age at marriage, with ages at first marriage for females generally ranging from 23 to 27 years, and for males from 25 to 29 years, and associated with this a situation in which a relatively high proportion of females, amounting in some countries to as much as 26 per cent, did not marry at all[11] As is shown below, these patterns of late marriage and relatively high mortality have changed drastically in recent times, but when combined they kept maximum growth rates in these countries to levels which seldom exceeded 1.0 per cent per annum, and when mortality began to decline rapidly in the late nineteenth century, fertility followed on a downward course, generally containing growth rates within limits ranging between 1 0 and 1 5 per cent.

19. When the great economic depression struck the industrialized countries in the 1930s, birth rates fell to levels that had never before been experienced, largely because of rational decisions by millions of parents to avoid having children and partially because of postponement of marriage Both were parts of long-term trends, accentuated temporarily by economic difficulties

20 In terms of net reproduction rates, which provide a synthetic measure of family size in relation to all women (whatever their marital status), the average number of children in many countries fell below the level required to replace each generation of parents. At the levels of nuptiality and mortality then prevailing, the average number of births required of each marriage in order to sustain populations at replacement level

[11] K. Davis and J Blake, "Social struct [illegible] fertility, an analytic framework", *Econo[illegible] el[illegible] C[illegible] Change*, vol IV, No 1 (.

when a stationary age composition would be attained would have been about 2.7.

21. It is not relevant here to discuss the reaction of national Governments to this situation, except to relate that it led to very grave concern in many of the countries that experienced below-replacement levels of fertility, and that the trend stimulated many inquiries, some of them officially sponsored, concerning its future import.[12] During the 1930s and 1940s, there were many forecasts of a population decline in the relatively near future. Why this did not occur is the subject of further discussion in paragraphs 101-112.

22. The point to be emphasized here is that, considered in historical terms, the fertility and mortality patterns reached in the more developed countries in the years immediately before the Second World War made for a unique nuclear family, a family in which the forces of life rather than those of death dominated the total situation, with regard to both parental expectations of remaining alive until their children reached adulthood and parents' expectations that the children born to them would also remain alive. The small family with an average size of two or three children appeared to have come to stay. There were still wide variations between economic and social classes, with the more wealthy and better educated showing greater efficiency in the control of family size than the poorer and less educated. While these patterns of differentials were to change substantially, the high degree of rational control exercised by parents in the formation of their families was not to weaken.

Trends in the less developed regions

23. In contrast, the situation in many of the less developed countries remains one in which families average from five to six children, even seven children in a few instances, the major demographic variable that has changed being mortality. The widening gap between relatively stable fertility and rapidly falling mortality has been emphasized so often, for so long, that it need not be further emphasized here, save to note that the situation in the less developed world is still often referred to as one that is static. In fact, this is not the case. The decline of mortality, which has extended the expectation of life in many countries from earlier levels of from 30 to 35 years to levels beyond 50 and even in some cases above 60 years, produced a dynamic situation that was unique in human history, that is, a situation in which growth rates generally ranged above 2 per cent per annum and in some instances exceeded 3 per cent. However, there are now declines of fertility in many countries that are still less developed economically. The exponential prospect, alarming to so many concerned about man's capacity to sustain the massive population increase that would inevitably be derived from the widening gap in rates of fertility and mortality, constituted for most people the real core of the population problem facing mankind. The implications of this still widely prevalent pattern is discussed below, but it is to be emphasized here that growth rates at the levels described above have given rise to a situation unprecedented in human history and, therefore, require unprecedented approaches in policy terms to solve the economic and social problems arising from them.

Households and the family life cycle

24. In terms of the composition of the family, it may appear from the foregoing discussion that household size would be much larger in the less developed countries with more traditional societies than in the economically more advanced, more modernized regions. This seems an obvious inference from the suggestion that average family size in the former is generally from five to seven children ever born to a woman who has completed the reproductive span, compared with the average of about three children in the more developed countries. In fact, differences in size of household between these two situations are less than is often assumed. The same proposition may be applied to the comparison between the household size of the nuclear family of developed countries today and the family in the same countries say 100 and 200 years ago. One basic reason for this is the fact that, with the high mortality of previous times, it required more births to produce the same number of children still living with their parents at any given point of time than is the case where mortality is low. There were also differences in the ages at which children left home. Moreover, historical research has shown that the extended family may have been much less prevalent in the past than has been generally recognized. In countries reporting to the United Nations in 1968-1969,[13] the average size of private households was found to be between approximately three and four for more developed countries and between approximately five and six for less developed countries, and these latter figures may be near the mark for many communities in the historical past.

25. It is of interest therefore to relate households to the life cycle of families of different types. This may be done by taking three models, the first based upon a stable population with life survival values typical of a traditional family (that is with high fertility and high mortality); secondly, a transitional family (that is one with high or relatively high fertility, but relatively low and falling mortality); and lastly, a developed or post-transitional family (that is with low birth rates and low

[12] An inquiry of particular significance was the United Kingdom Royal Commission on Population, 1949, *Report*, Cmd. 7695 (London, HM Stationery Office, 1949).

[13] See United Nations Secretariat, "World and regional population prospects", *Population Debate*, vol. I, part two. The following figures were estimated (table 8) for the average size of households (persons):

	1965	*1970*
World total	4.54	4.47
More developed regions	3.54	3.40
Less developed regions	5.22	5.16

mortality) The first of these models may be taken as illustrating the situation in historical times of low rates of growth with largely natural fertility and high mortality, while the second may be taken as illustrating the situation in many developing countries today, yielding high and rising annual growth rates, some of which may be as high as 3 per cent or higher This category embraces two essentially distinct types of countries, that is, those having relatively high, stable levels of fertility and falling mortality, as in India, and those in which mortality is falling and fertility is declining. Whereas both represent conditions of disequilibrium, the rates of population growth generated by the disequilibrium are somewhat higher in the former than in the latter The third category represents a return to lower rates of growth deriving from a high degree of rational control by parents over their fertility and from extremely low mortality levels[14] The expectations of life at birth represented in these models were 25 years for females and 22.85 years for males in the first case, 60 years for females and 56 47 for males in the second case; and 75 and 71 19 years for females and males, respectively, in the last case. These models are essentially research tools and therefore represent situations into which not all countries fit Consequently, it was not possible to classify certain countries satisfactorily as traditional or transitional. Thus, while the groupings were not made arbitrarily, for a few countries a case can be made fo the alternate classification

26 The basic assumptions were plausible in term of historical experience The "traditional" or "high equilibrium" situation assumed levels of fertility jus sufficient to provide for a generation's replacement wit the low life expectancy assumed The "transitional" o "disequilibrium" situation assumed the same fertilit level or a decline with the medium assumptions con cerning life expectancy, and the "low-equilibrium" o "developed" situation showed a return to a stationar state on the basis of a high expectation of life Nup tiality was held constant throughout, with women mar rying at age 20 and males at age 25, and no remarriag was assumed

27 With these assumptions, an examination wa made of four factors basic to family composition an life cycle in order to yield net reproduction rates o unity in the first and third cases (or equilibrium) an to yield a net reproduction rate of just over 2 5 in th intermediate, disequilibrium (or transitional) case. Es sentially, measures were gross fertility, the probabilit of parents living through the woman's childbearin years (parental survival), the net level of fertility o the births required to replace child non-survival an thus replace each woman; and the proportion of female surviving from birth to marriageable age

Type	*Gross level of fertility*	*Parental survival*	*Net level of fertility*	*Child survival*	*Net reproduction rate*
Traditional	6 438	0 69054	4 4774	0 45786	1 0
Transitional	6 438	0 91134	5 9090	0 87010	2 5079
Developed or post-transitional	2 1202	0 98818	2 0951	0 97846	1 0

28 The family corresponding to each of these three models may then be viewed in terms of the number of persons in the family multiplied by the time they live together. When thus examined, it is evident that the typical family of the developing world today is much larger in terms of person-years than its predecessor which was typified by high fertility and high mortality, but its "size" is spread out over much greater average length of life.

29. In the case of the low-equilibrium family in developed countries, which experience low mortality and low fertility, the children born are only about half as numerous as in the transitional family just described; but in terms of person-years this small family is in fact larger than the family in the initial category typified by high mortality and high fertility. Another interesting feature indicated by these models is that in the transition from the high-fertility and high-mortality situatior to that of high fertility and low mortality, the chance that a woman will provide a male heir is substantiall increased even though there is no change in the averag number of children born This is, of course, wholly a function of improved survival rates, and, in the assumptions chosen in the model, the chances that a family will have a male heir rise from 21 per cent in the firs case to 44 per cent in the transitional stage. The author of this model approach has suggested that, in societies in which male succession is important, th sharp increase in the likelihood of having a male hei may make parents more willing to accept the increasin burdens of child care which are also implied in the situation of declining mortality.[15] On the other hand, it may be that as parents become aware of the probability of a child surviving as against the likelihood o a child dying, which is typical of the high-fertility and high-mortality situation, a real incentive may be created for a reduction in the number of children born, thus beginning the move to the final phase of the transition

[14] Norman B Ryder [illegible] life cycle", *Populatior* [illegible] of consistency with t [illegible] Ryder's terms "high [illegible] equilibrium" have been taken to correspond to "traditional", "transitional" and "developed" or "post-transitional", respectively.

[15] *Ibid.*

towards controlled fertility and low mortality. Support for this view is perhaps found in the observation that there appear to have been few societies in which birth rates have not substantially declined by the time the expectation of life at birth reaches approximately 60 years of age. Mexico is the evident exception.

30. However, the "person-years" approach described above does tend to modify the commonly accepted picture of the family during the phase of demographic transition. The lack of incentive to restrict family size in the transitional phase may also result from the fact that the ratio of consumers (children under 15) to producers (parents and children 15 and older) within the family in terms of person-years, unlike the simple child-parent ratio, is only marginally greater in the demographic transition phase than in conditions of high mortality-high fertility. This micro-demographic perspective contrasts sharply with the usual macro-demographic dependency-ratios approach, which tends to show a much greater disadvantage for the population in transition. Yet both perspectives may be correct, and the explanation lies in the fact that the decline in mortality, and the resulting high increase in growth rates, means a sharp increase, of 150 per cent per generation, in the number of families. Thus, although, within the family, the ratio of consumers to producers does not increase sharply with declining mortality, there is a sharp increase in the proportion of children in the aggregate population. The policy implication is that the pressing problem of national economic development, exacerbated by the heavy load of dependants in the populations of the developing countries, may not have a parallel at the family level, except in so far as the force of population increase is reflected in perceptions of increased competition among more families.

31. As there are very few studies of families at the micro-level, particularly in societies undergoing this phase of transition, the argument summarized above must be treated as a hypothesis yet to be tested by empirical research rather than as a firm conclusion. Parents rearing children in the transitional stage will be less likely to be influenced by the generational implications of their actions, or by the total population profile of which they form a part, than by the realities of the household in which they live. They normally do not notice the greater opportunities for their children, as compared with their childhood experiences, until they have completed family-building. One factor that must be impressed upon them is that of the survival rate that ensues from rapidly falling mortality, compared with the high-mortality situation that probably prevailed when they themselves were children. On the one hand, the transitional phase adds considerably to the burden of aged dependency that follows from declining mortality. In any event, solutions to the problems of the aged require the intervention of the wider society, in terms of efficient health services and social services for the aged; and this intervention does begin to break down the self-sufficiency of the family and the associations with an extended family system which are often taken as symbolic of the traditional, peasant society. On the other hand, however, the increased survival of children ensures that more of the children born shall survive to share responsibility for the aged parents. Parents are generally unaware of this advantage also until childbearing has been completed.

Family structures and demographic change

32. There seems little doubt that the principal burden that bread-winners will have to carry for many years ahead will relate to juvenile dependants rather than the aged. One of the main correlates of economic development is higher literacy rates and the generation of occupational skills through expanded educational services, and rising *per capita* expenditure on education will compound the increasing burden that will be derived from demographic factors alone. The following summary of the age profile of more developed and less developed regions of the world illustrates this point:

Region	Percentage age distribution			
	0-4	5-14	15-64	65 and over
Less developed regions	15.9	25.7	55.1	3.3
More developed regions	9.5	18.6	63.0	8.9
World total	13.9	23.4	57.6	5.1

SOURCE: Preliminary version of United Nations Secretariat, "World and regional population prospects", *Population Debate*, vol. I, part two.

33. The ratio of consumers to producers among inhabitants of the less developed regions in 1965 was estimated to be 81, compared with only 59 in the more developed regions. United Nations projections based on the medium variant suggest that this discrepancy is unlikely to narrow significantly until after approximately 1985.

34. The models used earlier in this chapter again greatly over-simplify the real situation because the transition from the first phase through the second transitional phase to the low-equilibrium situation of developed countries, which is based on low fertility and low mortality, can only be achieved by major transformations in society through the processes of economic and social development. As suggested above, such processes involve increasing years of dependence at young ages, meeting the social cost of compulsory education, providing efficient health services and adequate nutrition, and probably major changes in employment structure as well as in the distribution of population. The family tends rather to adapt to these changing situations than to be itself a cause of such change. But the Ryder models do bring out very clearly one point with major policy implications. As a population begins to move from the high-fertility and high-mortality situation towards the transitional phase, new dynamic growth forces are generated in its age structure. Young children begin to survive instead of dying. Children grow to marriageable age in numbers which are increasing at a much higher rate than the age groups formed by

their parents; without a change in their fertility patterns, birth rates will tend to rise simply because there is an increasing number of young parents rearing children, and the growth dynamics created by this changing demographic structure of the family virtually guarantees growth for two generations, before the final phase of equilibrium based on low mortality and low fertility can be achieved.

35. This generation effect is also visible in many of the currently developed countries, as a result of the "baby boom" that followed the Second World War That boom produced cohorts of young children far in excess of the numbers born in the low birth rate years of the great depression of the 1930s, and these cohorts are now themselves of marriageable age and producing another generation of children Consequently, there are few countries even in the more developed world which can avoid a considerable increase in numbers for some years ahead, even though the fertility level of the current generation of parents may fall to, or below, replacement level in terms of completed family size, with replacement requiring an average of approximately 2.1 children born per woman by the end of her child-bearing years, or about 2 3 or 2 4 children born per married woman, depending upon the prevailing levels of nuptiality.

36 The dynamics of growth in the world today are much more pronounced in the less developed than in the more developed regions, and this will be reflected in the large increases that are bound to occur in the proportion of women of reproductive age (15-44), all of whom are already born.[16] Consequently, family formation will be increasing at a much faster rate in the less developed regions than in the more developed countries, and, as fertility is likely to remain much higher in the former than in the latter over this 20-year period, the difference in the numbers of young people will be even greater than in the case of their potential mothers Here, too, there are important implications for the formulation and implementation of policies by the less developed countries, in terms of schooling, employment opportunities and family formation, if the quality of social and economic life is not to deteriorate. This leads to the question of national goals with reference to family welfare

FAMILY STRUCTURE AND POLICIES IN INDUSTRIALIZED COUNTRIES

Emergence of the small family

37. Attention has already been drawn to the fact that the demographic patterns typical of industrialized or developed countries are new to human history. The average number of children surviving each woman who has achieved reproductive age now generally ranges between about 2.2 and 2.7; this is the result of the most efficient system of reproduction and the most efficient control of mortality ever experienced in human societies With regard to mortality, any further improvements that may be achieved will have only marginal influence on effective family size, since the overwhelming majority of infants born in societies with expectations of life at birth of between 70 and 75 years will live as parents to an age at which family formation is completed

38 When examined statistically in terms only of the numbers of children born per woman, the conclusion may be drawn that patterns of family formation have, in fact, been remarkably stable in most countries during the past quarter of a century or so, although a majority experienced a "baby boom" through the 1940s and 1950s This boom has often been described in terms of increase in completed family size and was attributed at first to parents making up time lost during the period of the great depression of the 1930s, when both marriages and births tended to be postponed. This is part of the explanation, but in terms of family formation it overlooks a major revolution in nuptiality that has taken place in a great many countries

39 While there have traditionally been some differences among countries and some variation in marriage patterns according to social and economic class, much of the currently developed world showed patterns of marriage in the eighteenth and nineteenth centuries that were largely in conformity with Malthus' dictum of moral restraint[17] The classic case of restraint was, of course, Ireland In addition to the relatively high age at marriage emphasized earlier, a comparatively high proportion of women did not marry at all These were important factors in controlling the size of the family expressed as an average number of children born to women irrespective of their marital status. As concerns more recent events, such as the renewal during the 1940s of the downward secular trend, it can be shown, by relating family size to married women only, that, in a majority of the countries, much of the rise in fertility commonly referred to as the "post-war baby boom" was due to a change in nuptiality towards patterns that resemble more closely those prevailing in many of today's developing countries

New marriage patterns

40 Evident from about 1945 are the beginnings of a major change in traditional patterns of nuptiality in many of the high-income, industrialized countries In country after country, the proportions married began to rise and the mean age at first marriage to fall for both males and females. In many countries, the drop in mean age at first marriage was around two years, and the proportion of women marrying by age 35 rose

[16] United Nations Secretariat, *loc. cit*

[17] John Hajnal, "European marriage studies [illegible] in D V. Glass and D E C. F[illegible] eds [illegible] in *History* (London, Arnold, 1964)

from between 85 and 87 per cent to as much as 95 per cent.[18]

41. This means, of course, that with modern marriage patterns, relatively few women are not now involved in the process of family formation, and this marriage revolution has been one of the major factors in sustaining birth rates and in causing the post-war baby boom. But the demographic force of this revolution is now receding in most countries, and the main impetus of the enlarged age cohorts of babies born in the 1950s will soon have passed beyond the average age of first marriage. Herein undoubtedly lies one of the major explanations for the recent decline in birth rates in many developed countries; but it also appears that, in many cases, marital fertility is also declining.

42. Other changes have been associated with the revolution in marriage patterns. The life cycle of the family has also undergone a marked change. In the first place, most young women now enter the labour force after completing their education and increasing numbers of them also continue their education to advanced secondary and tertiary levels, thereby extending the roles they can play through all sectors of the labour force. Marriage itself is no longer the major factor removing these young women from economic activity. Increasing proportions of young married women remain in employment after marriage, and withdraw only with the onset of pregnancy and the birth of the first child. Further, compared with the period of the 1930s, when the proportion of childless women in some countries exceeded 20 per cent,[19] the proportion of women who do not have at least one child appears now to be settling at about 10 per cent. About 90 per cent of marriages thus result in at least one child, and about 75 per cent in a second child. There does not seem to be any marked tendency towards a major enlargement of intervals between births, although in some countries there is evidence of a tendency in very recent years for the interval between marriage and the first birth to be increasing. However, the most common pattern of family formation in the developed countries today is that of early marriage, followed by six to eight years in the process of childbearing, and then a period ranging between 15 and 20 years of fecund life no longer associated with deliberate pregnancy.

Marriage, family formation and employment

43. This model is, of course, a highly stylized one which ignores the variations that still occur among countries and between different social and economic classes, but it is also to be noted that differentials in terms of marriage, age and completed family size appear to have diminished rather than to have increased. Furthermore, whereas the largest family size was traditionally found among the lowest income classes and among groups with the lowest level of education, the emerging modern pattern is one of relative equality of family size in such groups. Moreover, there is some evidence of a positive correlation between income, educational and social class, and completed family, sometimes apparent only in groups other than those of lowest socio-economic status.[20]

44. In other words, the extent of rational control over the number of children born—associated with the emergence of new norms and ideals governing family size—has been greatly enlarged and deepened, despite some increase during the 1950s in the average size of completed families. Of equal significance with these changes in the pattern of differentials, however, is the importance of the changes in family formation in sociological terms. Increasing proportions of relatively young women are freed at a relatively early age from the process of childbearing to return to the labour force or to other areas of social and public life. In other words, the claim to equality of rights and status can and does become a reality, at least from the point at which the youngest child in the family has attained the age of five or six years and has entered the compulsory education system. Developed societies have already provided a complex (and for the most part efficient) network of social institutions and social services, such as preschools and kindergartens, and compulsory schooling to the age of 15 or 16, generally in publicly supported schools, which represents public support for the mothers of young families.

45. The reaction of the modern mother to these changing situations is seen in the increasing proportions of married women now recorded in employment, either full-time, or at least on a substantial part-time basis, say, for 15 or more hours per week. Again, there is a considerable variation among countries in this matter, but in most of them, the proportions employed have been increasing steadily over the past 20 years or so, and it is now found that women form from one third to one half of the work force. In the USSR, it is reported that 51 per cent of the work force are women.[21] In some other western European countries, the percentage is as high as 40 per cent and the evidence is that this proportion is likely to increase rather than decrease.

[18] Consider the following percentages of groups ever married at ages 20-24 and 40-44:

	Age 20-24		*Age 40-44*	
	c. 1920	*c. 1960*	*c. 1920*	*c. 1960*
England and Wales	27	58	82	90
Denmark	28	54	72	92
Netherlands	24	41	77	90
Sweden	22	43	77	90
Australia	32	60	83	95

[19] I. Taeuber, *loc. cit.*

[20] See C. F. Westoff and others, *Family Growth in Metropolitan America* (Princeton, New Jersey, Princeton University Press, 1961); *idem, The Third Child* (Princeton, New Jersey, Princeton University Press, 1963); and Gwendolyn Z. Johnson, "Differential fertility in European countries", in National Bureau of Economic Research, *Demographic and Economic Change in Developed Countries* (Princeton, New Jersey, Princeton University Press, 1960), pp. 26-72.

[21] I. Y. Matyukha, "On the impact of socio-economic and cultural factors on family development", *Population Debate*, vol. II, part six.

Some sociological implications of new family patterns

46 This revolutionary change in family structure also means that marriage partners are subject to a long period of sexuality which is in no way associated with the production of children and adjustments to this type of situation no doubt explain at least part of the trends in modern western societies which are often seen as evidence of increased permissiveness in sexual matters.

47. No attempt can be made here to probe the extent of changes in ethics and morals, but there is evidence that the family in developed countries today is undergoing major adjustments from the standpoint of the factors discussed above Some of these adjustments may themselves be causes and others are undoubtedly effects Some of these changes are brought about by changes in moral codes and some of them by technological factors which change the whole basis of social living (for example, transport, the mass media and modern contraceptive devices)

48. One result of these changes may be seen in the very marked increase in divorce rates in many countries, which now means that one fifth or more of marriages ends in divorce, compared with possibly one tenth in many countries prior to the Second World War. However, the increased incidence of divorce cannot be taken simply as clear evidence of increased strain in marital relations, because it also reflects the major changes that have occurred in many countries with respect to divorce legislation It is now easier than before for couples who wish to terminate their marriage to do so. It should also be noted that, while divorce is on the increase, so is remarriage, so that the numbers of women married at any point of time tends to be increasing rather than decreasing Undoubtedly, this pattern of greater flexibility with respect to marriage dissolution and remarriage tends to place new strains on the children involved, and studies suggest that there is a correlation in many countries between many aspects of juvenile delinquency and the maladjustments of parents that lead to marital dissolution.

49. Another trend in the developed societies appears to be the increasing segregation of the members of the extended family group. Almost universally among developed countries, the basic family unit is now seen as the nuclear or biological family of parents and their children, living as a separate unit,[22] and, in all countries, the introduction of comprehensive social service policies has been associated with increased provision for persons in the higher age brackets when they leave the work force. The majority of developed countries, for example, now provide national superannuation as a right, and others require employers to contribute towards pension schemes for their employees Such measures, when associated with the very great mobility of modern developed societies, encourage the segregation of the grandparents' generation from immediate and continuous association with the nuclear family. Such segregation is also encouraged by the suburbanization associated with the development of major cities However, there are many variations in respect of these conditions, and the lack of direct association between the generations on a day-to-day basis does not necessarily mean the absence of frequent contact between them Just how these contacts operate and what their significance is in family relationships is an area still inadequately researched Segregation of living-quarters does not necessarily mean that parents and their children have renounced all social and economic responsibility for aged grandparents Also, the extended family is still very much a reality in some southern European countries However, it is fairly clear here too that the generational interactions in family groups have undergone a major change over the past 20 or 30 years, in response to the demographic, social and economic changes referred to above Some sociologists are now turning their attention to ways in which the extended family group can be kept in closer association through the concept of community development within the suburban area as opposed to chaotic suburban sprawl [23] But it is emphasized that the system of households composed essentially of the nuclear family has been the basis of family organization for a very long time and that the variation in average household size over the past century or more, as between the currently developed and developing countries, has been much less than the variations in the number of children born [24] In other words, the extended family may involve a complex form of social interaction, but the household of the nuclear family has formed the core of the unit that lives together, and the size of this group depends more upon the years of survival from birth of its members than upon the number of children born.

50. This leads to another sociological aspect of major interest in policy terms The levels of mortality now prevailing mean that, divorce apart, the chance of two parents being available and responsible for children until near the end of the parents' working life are now very much greater than when life expectancy was about 40 years or less, as was the case until at least the first

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[22] The 1960 census of the United States of America showed that 91 5 per cent of families each lived together as a group without parents or grandchildren

[23] Margaret Mead, in particular, is propounding this [illegible] of intra-generational community life as the basis of [illegible] *living*

[24] Compare, for example, the average size of [illegible] in 1965, given in United Nations Secretariat *[illegible]* [illegible] (preliminary version).

Europe (low fertility, low mortality)		*Africa (high [illegible] mortality)*	
Western Europe	3 03	Western Africa	[illegible]
Southern Europe	3.94	Eastern Africa	[illegible]
Eastern Europe	3.31	Middle Africa	[illegible]
Northern Europe	3 03	Northern Africa	[illegible]

In contrast, the difference in average [illegible] to each woman was between approximately [illegible] 6 in Africa

quarter of the nineteenth century.[25] In addition, children born are likely not only to survive; but, as a result of the demands of modern industrial society in terms of training for employment, to remain within the household for a very long period. For 10 or more years of that period, one major cost of the children will be carried by society in the form of education at a publicly supported school, except where social ambitions encourage the parents to send their children to private schools. But, in general, society is organized to cope with the major educational costs of children to the point of basic entry into the work force. However, as affluence and the complexity of the occupational hierarchy increase, and as the extensions of opportunities for employment emanating from the service industries, commerce and the professions are extended, increasingly large proportions of these children are continuing full-time education, often until they reach the age of majority (generally 21) and even beyond. It is common for up to a third of young people to be in full-time education to the age of 21 years; and while it is true that the costs of this higher education are increasingly being met by society as a whole, considerable additional financial burdens remain with the parents. In addition, new patterns of social relations have to be generated within these households which consist substantially of two generations of adults. Perhaps the strains associated with exposure to this new demographic situation may be one reason for the growing emphasis in recent years upon the "generation gap"; in any case, this new situation requires new approaches and new adjustments on the part of both parents and children.

The State and the family: some political responses

51. In many countries, there is now considerable pressure to devise policies which, at least, do not encourage population growth and which may indeed discourage parents from having more children than are required to sustain population at a stationary level in terms of the net reproduction rate. Several Governments, including those of Australia, the Netherlands and the United States of America, have initiated inquiries into many aspects of population with a view to determining desirable levels of growth and desirable maximum populations, and there have been inquiries in the United Kingdom of Great Britain and Northern Ireland, at the request of the House of Commons. The United States inquiry concluded that there were positive advantages in having the population achieve stability in the reasonably near future.[26] In contrast, some countries in Europe view the decline in the birth rate with concern and at least one Eastern European country was faced with the prospect of actual population decrease through an excess of deaths over births in 1973. It is not surprising, therefore, that some of the concerns that were expressed in the 1930s should be heard again, but this does not mean that there is a real likelihood of any Government urging a return to the type of family that was typical of the late nineteenth century.

52. Precisely what constitutes a "population policy" for many of these developed countries is difficult to determine, because many of the social measures that have been applied in terms of family welfare have not been pro-natalist in their objective but have been introduced as integral parts of comprehensive social security schemes designed to give the whole population a minimum "floor" in terms of social justice.[27] Reference has already been made to the trend towards universal superannuation for those who have finished their life's work. Many countries have also introduced cash grants and benefits to mothers in connexion with maternity and have provided economic assistance in the form of child-support payments. In most cases, these payments have been seen, when introduced, as desirable social measures rather than as measures that would bring about deliberate attempts by parents to alter the structure or size of their families; but in a few cases, such measures have been deliberately pro-natalist. The most striking case in this regard is probably France.

53. The extent to which such measures have changed family size is very difficult to determine. In the period from the Second World War to 1960, the United States had one of the highest birth rates of the developed countries and yet had few social benefits that could be called deliberate "family benefits"; in France, where child support payments were on a very substantial scale and where many other cash benefits applied to the family, the birth rate remained below that of the United States. However, in almost all countries of western and northern Europe, and in the United States, Canada, Australia and New Zealand, birth rates have fallen steadily since the early 1960s, even though most of these countries have quite advanced and comprehensive social service benefits designed to ease the economic and social burden that parents must bear in rearing their children. There is apparently no simple answer to the question how far government policy tends to affect parental decisions concerning family size. More positive are legislative measures which can prevent the occurrence of events, such as the establishment of a legal age for marriage or legislation determining the conditions under which pregnancies can be terminated. Among those who advocate slower rates of population growth, for example, zero level, there is a considerable demand for more effective disincentives than Governments have so far been inclined to apply.[28] Some writers have proposed progressively higher tax rates as the number of children increases, tax benefits

[25] N. B. Ryder, *loc. cit.*

[26] The Commission's Report, *Population and the American Future,* Signet Special (New York, New American Library, 1972). This is the published advance copy of the Commission's Report, which was later tabled with the President. So far, no action appears to have followed from its recommendations.

[27] For a general discussion of policies in developed countries having a population objective, see W. D. Borrie, *The Growth and Control of World Population* (London, 1970). A comprehensive study of such policies in developed countries is currently being published under the editorship of B. Berelson of the Population Council, Inc. (New York).

[28] Kingsley Davis, "Population policies: will current programs succeed?", *Science*, vol. 158 (1967), pp. 730-739.

for those who defer marriage, and higher levels of child support benefits for the first child, with successively smaller amounts as the size of the family is increased So far, most Governments have shown an extreme reluctance to interfere with the right of couples, once married, to determine the size of their families and the spacing of their children, and the declarations of the Tokyo Conference and of other international assemblies concerned with this question suggest that this right has widespread support

54 However, some more positive steps not only are now recognized as being within the prerogative of Governments, but are considered by many Governments to be within their duty in terms of social justice Such measures relate to the right of all parents to adequate information and service in the field of family planning, to the provision of adequate population and sex instruction for young people before marriage, to adequate medical services for all mothers during pregnancy and at maternity, and, in a growing number of countries, to the liberalization of abortion in order to terminate unwanted pregnancies The last measure is still a matter of considerable controversy However, intervention by the State may be interpreted as an attempt to regulate, with less risk to the mother, a practice that is now recognized as being a very widespread and often dangerous method of birth control, encouraged by the lack of adequate family planning information and services [29] This appears to have been the motivation of state action in Japan, and more recently in the United Kingdom, the United States and a number of European countries. Although it is generally recognized that abortion is an inefficient method of birth control, it is, none the less, widely used Statistics show that the level of abortions has occasionally exceeded that of live births, and that, while accurate figures are obviously difficult to obtain, it is probably no over-statement to say that, in most developed countries, abortions in recent years have probably numbered about one third of the number of live births [30] However, the spread of new, efficient contraceptives, which are readily available to women and men in most countries at relatively small cost, is likely to reduce the incidence of abortion For example, the use of the contraceptive pill has spread in many countries to the extent that over one half of the estimated number of contraceptors use this method of family planning, and in one or two countries it may in fact be the method used by over half the number of females at risk.

Families and policies in transitional societies

Demographic characteristics

55 In the major developed regions of the world, family structures have been influenced by the survival of an average of two to three children at the time that the mother has completed her childbearing years. There are, of course, many local variations, but the broad trends in most of these countries over the course of many decades were similar Further, in the developed countries, there were similar patterns of marriage, child-spacing and completed family size.

56 Patterns are more diffuse in the less developed areas, which include most of the countries in Africa, Asia (excluding Japan, among others) and Latin America (excluding the temperate zone) Among the countries of these regions, there is a great variety of family composition and family structure, as well as of growth rates There are still areas in which mortality and fertility are both very high, with matching levels of mortality yielding growth rates that are very low But throughout most of the regions, the demographic transition has already begun in terms of declining mortality, and, in some instances, the transition seems to be proceeding to the final phase, as it has in the developed countries But the growth rates in the less developed regions still vary widely, amounting in some cases to well above 3 per cent The most homogeneous element in this situation is, in fact, fertility and family size For while there are a few cases, as already emphasized, where birth rates have dropped substantially, throughout most of the regions the variation in fertility yields an average family size of between about five and seven children This means that the fertility phase of the transition cycle must be completed before growth rates can be brought down to the levels proposed in the family policies adopted by many of these countries

57. As stated above in paragraph 25, the transitional phase is broad and encompasses countries in different stages of demographic development A related factor is that family size and structure also vary to an important degree among countries in this broad phase of transition Countries in the earlier phase of disequilibrium are experiencing more rapid population growth (which may or may not impinge adversely upon the family) than countries in the latter part of the transition The view that the family has of its own situation is likely to be different in the early and late segments of the transitional phase Some of the great and more complex populations of the world are in various stages of this phase and, because of their complexity, do not readily lend themselves to precise classification. A brief description of the conditions of disequilibrium in some of the areas that are characterized by exceptional circumstances is given below.

Some characteristics of selected transitional populations

Latin America

58. Among the less developed regions, some of the greatest variations in family size and structure within national boundaries are to be found in Latin America The average expectation of life for the whole region

[29] The Japanese law of 1949 was designed not merely to legalize abortion but also to control undesirable social and [illegible]

of approximately 60 years around 1970 masks situations within sectors of the region that range from strongly entrenched small-family systems with high expectations of life (e.g., Argentina), to large-family systems and relatively high mortality levels, although in most parts of the region, the latter have moved downward and are now considerably below those in most parts of tropical Africa, for example. But a feature of Latin America is also the very wide range of variations between income and social classes within many countries.

59. Total fertility rates in Latin America around 1960 ranged between just over three children in Argentina, which is considered to be developed, to over seven children in Colombia, but within these national averages there were a great variety of national types, which reflected the profound differences found in the Latin American social structure, the unequal access of people to goods and services, and the different values, norms, motivations and attitudes arising from the structurally heterogeneous sectors of society.[31]

60. In rural areas, the higher income and upper social classes tend to have families of a size that reflects effective family planning. Here, marital unions have generally been the product of legal and religious marriages, and have been highly stable. Upper-class urban families have tended to show similar features, but below the highest social class are the upper urban bourgeoisie where intra-familial relationships tend to be more egalitarian and less patriarchal, although unions still tend to be legal, based on religious marriage, with a high degree of stability. Further down the social scale, traditional patterns tend to weaken. The lower-class rural family has a high proportion of consensual unions, but the unions tend to be very stable and fertility to be high. In contrast, the semi-artisan or marginal urban family is less stable and has a high level of consensual unions. Last comes the "worker" family type, with a high proportion of consensual unions which tend to be more stable than the unions of the artisan class.

61. This typology of such a vast and complex area and population undoubtedly oversimplifies the situation, but it does serve to illustrate that in societies which may appear on the surface to have a considerable degree of homogeneity (in this case, religious adherence, language, ethnic origin, etc.), social and economic differentiation is usually associated with many different patterns of family structure. In Latin America, some major manifestations of this proposition are found in the negative relationship between a husband's occupational status and fertility; the evidence shows that the highest fertility occurs among the lowest class of manual workers, and that a negative correlation exists between fertility and educational attainment of parents.[32]

62. In the Latin American situation, some social policies are implemented with the objective of assisting the poorer and less privileged members of society. Several countries have recently evolved systems of such social service, under the general title of "health and family welfare". The agreed objective of these programmes is to achieve, through better family planning, decreases in infant mortality (highest amongst the poorest classes), reductions in abortions, and in general better family health education. It has been found, however, that in many of these countries those who make the most use of these services and opportunities are mothers from households which, because of upward social mobility, either have already achieved or are already motivated towards having smaller families. In other words, being thus motivated already, they would probably achieve their objectives without the services offered, and the lower, less mobile social classes at which the services are primarily directed are unaffected.

63. Yet, despite this rather limited use of the family services, the picture in Latin America does appear to be one of rapid social change which is affecting family structure among a considerable proportion of the national populations.

64. The conclusion is that family systems in some societies are changing in response to new social and economic pressures, at least in some measure, as a response to the pressures placed upon the families by the decline of mortality.

India

65. India is considered here to belong in the transitional phase, because the demographic factor that appears to have moved most is mortality. Still very low, the average expectation of life at birth, which was estimated at approximately 48 years around 1970, was nevertheless very much higher than the figure of 30 years or less about 1931. Mortality levels have not yet reached the point at which they transform the patterns of survival within a family group. Nevertheless, there are signs that the forces of tradition with regard to family formation and family size may be changing more rapidly than such indicators as mortality trends may suggest. As already emphasized, India was the first major developing country to implement a policy designed to reduce growth rates[33] and, while the decline of average fertility for the nation as a whole appears to have been slight, the long-run effectiveness of the policies carried forward so far may be greater than has sometimes been suggested. For example, given the changes in age patterns following improvements in mortality, some increase in birth rates would have been expected to result from constant marital fertility and constant marriage patterns. Yet this has not occurred, so that it does seem that births prevented by family planning policies implemented in India may indeed

[31] Latin American Demographic Centre (CELADE), "Population policy and the family: the Latin American case", *Population Debate*, vol. II, part six.

[32] *Ibid.*

[33] For a review of the development and effectiveness of national family planning programmes, see B. Berelson, "National family planning programs: where we stand", in S. J. Behrman, L. Corsa and R. Freedman, eds., *Fertility and Family Planning: A World View* (Ann Arbor, Mich., University of Michigan Press, 1969), pp. 344-387.

have been considerable—just how considerable is methodologically extremely difficult to determine.[34] If Indian population policy should achieve its target of reducing the national birth rate by about 16 points between 1966 and 1975, births prevented by such a decline could be as high as 85 million If current trends continue, savings in births will be but a fraction of this, but the willingness of Indians who have been influenced by the family planning programmes to employ a wide range of contraceptives and to undergo sterilization, particularly vasectomy, is indicative of a considerable base of adaptation to change, rather than of a people bound by their mores to traditional concepts concerning the family The problem in India, as in most of the less developed world, may be more the lag in economic development and in levels of literacy, which may inhibit both the motivation for desiring fewer children and the capacity of the family planning programme to reach potential acceptors.

Indonesia

66. In Indonesia, there seems as yet to be little change in fertility levels, but considerable improvement in mortality levels Average family size appears to be in excess of five children, marriage age above that of, say, India, and the population is still predominantly rural and closely associated with peasant farming In Indonesia, the extended family appears to be less prevalent than the nuclear family. The annual growth rate is high, probably around 2 5 per cent in 1970, with the birth rate being about 45 per 1,000 and the death rate about 20. The expectation of life at birth is probably around 44 years, but the accelerating growth rate does not as yet appear to have altered the traditional patterns of marriage and family structure

The response to economic and social change

67. It was stated earlier that developed and developing regions can be distinguished by a number of indicators, one of the most consistent having been fertility In many areas, relative stability in fertility occurs with a lack of improvement in economic and social development In these instances the indicators show little if any change. One index of economic change is the gross national product; another is the interrelation between population growth and food production Measures such as these do not take account of social change. Nor do they take account of the declines in mortality that occurred despite the absence of substantial improvement in food production or in national income *per capita*

68 The ways in which the declines in mortality have affected the family cycle can be seen by looking at expectations of life at birth The less developed regions remain disadvantaged areas; in the more developed areas, expectation of life at birth averages around 70 years, whereas in the less developed regions average life expectancy is, on average, only approximately 51 years [35] Again there are considerable variations about this average In Africa, some national figures fall as low as 38 years, while in Latin America, some national figures rise above 60 years Although these less developed areas compare unfavourably with the developed countries, they compare favourably with the experience of human societies throughout history As pointed out earlier, until about the eighteenth century there was little evidence that expectations of life, averaged for large groups of people, had ever been sustained for any long period at levels much beyond about 35 years, in many areas, they were far lower Undoubtedly, there were short periods during which the major killing diseases were absent, thus allowing expectations to rise, but there were also periods when diseases brought very adverse situations with expectations often falling to about 20 years [36] There have been major disasters in the modern world that have raised mortality rates to very high levels, but, by and large, neither the severity nor the extent of these tragedies has been as great as in earlier times Thus, an average expectation of life at birth of approximately 50 years means that very considerable advances have been made in the control of infectious diseases and also in the prevention of prolonged famine over major regions

69 As far as the family situation is concerned, this means that over a great part of the so-called "less developed world", families have moved into the second model type discussed in paragraph 25, that is, the transitional family in which fertility has not yet fallen to any great extent, but in which the level of mortality has in fact fallen very considerably [37] In this situation, the family is faced with new features, some of which are advantageous, but some of which impose a greater strain upon it It has already been mentioned that, in the transitional phase, the probability that a male heir will be born and live to succeed the father in the next generation is greatly improved That probability is much higher in the transitional family than in either the traditional family or in the small family which has completed the demographic transition and moved again to a level of near replacement size Compared with the traditional family, the transitional family also offers a much higher probability that the parents of the family will be available for a much longer period for the upbringing of the children and for the pursuit of economic activities which will ensure adequate nutrition, health

[34] R G Potter, "Estimating births averted in a family planning programme" in S J Behrman and others, eds, *loc cit*, pp 413-434

[35] Estimates for life expectancy at birth of major regions, for the period 1965-1970, are given in United Nations Secretariat, *loc cit*.

World total	55 years
More developed regions	70 3 years
Less developed regions	51 years

[36] As late as the first quarter of the nineteenth century, expectation of life at birth was estimated to be around 25 years in some of the industrial cities of England W D Borrie, *op cit*, chap 4

[37] As indicated in para 25, the term "transitional' as used here refers to the situation of "disequilibrium" in Ryder's second model See N B Ryder, *loc cit*

services, housing and other amenities for the young family. In fact, when the family is followed through time, in a transitional society it is not even at a disadvantage with regard to the ratio between the number of consumers in the family and the number of producers.

70. It may be said that the transitional family is almost always surrounded by a situation of major and rapid social change of a kind that increases the overheads for which the parents are responsible. The changes in the social environment that have generally led to the development of the transitional family have also tended to leave that family more isolated in its total situation. The transition has generally been accompanied by greater mobility, and a higher level of internal migration from the traditional rural areas to cities, and thus be a weakening of the traditional ties between the immediate biological or nuclear family and the larger kin group or stem family from which it has gained support during its life cycle of giving birth to and rearing children for the next generation. [38]

Family types: nuclear and extended

71. While the nuclear or conjugal family is the major reproductive and social unit in many of the less developed areas, the wider kin group is still important in the total family situation. This is particularly true in countries where social change is least in evidence: it does appear that changes of a social character may be less rapid in countries that have vast populations than in those with small populations. Thus, the most rapid change appears to have occurred in some Latin American countries, for example, Chile, Cuba and Costa Rica, and in certain of the smaller countries or areas of the Asia and Far East region, such as Hong Kong, Singapore and the Republic of Korea, rather than in some of the giants of Asia, such as India and Indonesia, whose populations in 1970 amounted, respectively, to approximately 548 million and 120 million. The rural proportions of these populations is much higher than in some of the small countries mentioned above, and it is in some of the larger countries that the traditional family pattern still appears to have its strongest hold. [39]

72. However, this is not to say that the strongest family unit is not the nuclear or biological family. This certainly appears to be the case in Indonesia, and analyses of the situation in the world's two largest countries show that the nuclear family is a very important element in their social structure even though its existence is often still closely associated with the three-generation or extended family type. [40] But even where the extended family was strongly established in peasant types of society, this did not mean that individual households were large compared with the prevailing modern pattern.

73. It has been calculated that in a society with high birth and death rates, each around 50 per 1,000, and therefore showing a zero growth condition, the average size of family in a completely nuclear setting would be as low as 3.3. However, where there existed the modified extended household, there would be an average of 4.5 persons per household; where there was a full range of three generations in the household, average size would rise to about 5.8 persons. If the death rate were to decline from the assumed level of 50 per 1,000 to 30 per 1,000, in the process of change from the "traditional" or "pre-modern" to the "transitional" type of family in which fertility remained high at about 50 per 1,000, the average size of the extended family of three generations would tend to rise to nine or more. [41] In fact, there is little evidence that this size of household has followed from the decline in mortality. The increase in the size of households that could arise from the demographic model illustrated earlier seems to have been prevented, at least in so far as families declare themselves in terms of households, and one of the major reasons for this is undoubtedly the growing volume of migration out of the wholly rural areas, based on a peasant type of economy, in search of non-rural employment, particularly towards the large cities that have been increasing in size and number in the less developed regions.

International migration and urban-rural differentials

74. Urbanization has been continuing rapidly through all sectors of the world over the past 20-30 years. According to United Nations estimates, between

[38] S. Polgar, *loc. cit.*; M. Nag, *loc. cit.*; and I. Taeuber, *loc. cit.*

[39] It must be emphasized, however, that the apparent lack of change among most of the giant countries, as measured by indexes using national boundaries, does not necessarily prove that major changes similar to those apparent in such countries or areas as Hong Kong and Singapore have not been occurring in smaller, subnational regions, only to be hidden in national averages. In India, Bombay may be cited as one instance. There is also evidence of very considerable variations among states in India, for example, in the degree of response to national family planning objectives.

[40] I. Taeuber, *loc. cit.*; Mercedes B. Concepción and Felipe Landa-Jocano, "Demographic factors influencing the family cycle", *Population Debate*, vol. II, part six. In an interesting table, the authors of the latter paper classify the findings of a number of sample surveys with respect to households being "nuclear or extended". The following is a summary of these findings:

	Percentage nuclear	*Percentage extended*
Japan (1965 census)	68.1	31.9
Republic of Korea (1966 census)	66.8	33.2
Philippines (1968, sample survey)	79.1	19.6
Thailand (1968, sample survey)		
Rural	63.8	33.9
Provincial urban	63.6	25.3
Bangkok-Thonburi	56.1	28.3
Singapore (1966, sample survey)	80.0	20.0
Village in north India		
Jats and Brahmans	32.2	66.7
Other castes	64.8	33.7
Desert village in West Pakistan	41.0	49.0
Modjukto District, Java		
467 towns	57.8	32.4
153 villages	74.5	19.9

[41] I. Taeuber, *loc. cit.*

1950 and 1970, the urban population of the world increased from approximately 692 million to 1,315 million, and of this increase the component in the less developed regions rose from 256 million in 1950 to 623 million in 1970 [42] In terms of rates, this meant that the urban population of the less developed regions was growing at the rate of about 4 4 per cent per annum between 1950 and 1970, or over twice the average growth rate of total population There was, however, still a substantial increase in the rural sectors of the less developed regions, but these were estimated to have grown over the 20-year period by only 1 6 per cent and, although the rate was low, the volume of increase was extremely high, with the numbers growing from 1,393 million in 1950 to 1,914 million in 1970. In the case of the more developed regions, the rural population actually declined, from 422 million in 1950 to 391 million in 1970

75. These figures for the less developed regions indicate that the volume of migration was such that it implied major changes in the structure of the family in the more traditional non-urban areas But while, on the one hand, in certain countries, increasing numbers of migrants were probably giving firmer roots to the nuclear family, the disruption of family life caused by migration, the difficulty of obtaining work in cities and the tenacity of ethnic ties tended, in parts of tropical Africa at least, to strengthen the extended family in urban areas The precise extent to which the nuclear family has been, in fact, a self-contained unit is very difficult to determine Evidence has already been given above that the extended family plays a significant role in some areas, but that evidence also suggests that the nuclear system predominates in perhaps a majority of the developing countries Undoubtedly, there will also be wide variations in patterns among subnational religious and cultural groups However, no attempt is made here at a precise assessment of the significance of the extended family in the total patterns of social relations, as the task at hand is rather to consider the impact of the interrelations between demographic, economic and social change with reference primarily to the nuclear or biological family.

76 Lastly, however, it is emphasized that generalizations based upon statistics and other evidence referring to national or regional levels do tend to overlook the fact that within each country or region there are likely to be many types of families This is well illustrated, for example, in the case of Latin America, where there are frequently very large differences in both economic and social status between the urban population and the rural population, and also between clearly defined classes within each such region It has been pointed out that, in some of the countries of this region, the transition to the small family organized primarily on the basis of the nuclear family system now predominates among the upper social and economic classes of the urban areas, whereas in the rural and poorest sectors of society there has been little change either in family size or in the structure of social obligations and responsibilities [43]

77 Whether the extended family system tends to encourage higher fertility is a matter of some uncertainty and a subject that requires further research. According to some findings, particularly for India, nuclear families have higher fertility than do nuclear units in extended families In this connexion, it has been suggested also that the age at marriage tends to be higher, and the number of children born fewer, in extended families of essentially peasant societies, than is the case in peasant societies where the nuclear family predominates The evidence appears, however, to be inconclusive, and the change from the high fertility pattern to a low fertility pattern seems less dependent upon the type of family system prevailing than upon other economic and social factors making for rapid change in society

Age at marriage

78 More important than family type may be differences in marriage patterns Studies of past trends have suggested that the average age of marriage in many of the currently less developed countries has tended to be lower than was traditionally the case in the industrialized or more developed countries It has already been observed that the latter have themselves undergone a major revolution in recent years in terms of the average age of marriage and also in the proportions married The age of marriage has been lowered and the proportions married now conform to the pattern of universal marriage, with about 95 per cent of women being married in many societies by the age of 35 By contrast, one reaction to the process of social change in the developing countries appears to be a tendency towards raising the average age of marriage There are, of course, still very wide differences among these countries For example, it has been estimated that the mean age of marriage in India has recently been as low as 16 years and, in fact, may still be around this figure

79 It has been suggested by some writers that one reason for the high fertility and high growth rates of some societies in the less developed regions is the marriage custom of polygamy, but there is little firm evidence that this custom leads to higher fertility, except in cases of extreme imbalance of the sexes following wars and similar disasters Indeed, there is considerable persuasive evidence suggesting that polygamy in fact contributes less to national fertility than do monogamous marriages. [44] In any case, one of the reactions to the social changes that have been occurring appears to be a lessening of the practice of poly-

[42] United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol II, part two, tables 14 and 16

[43] Latin American Demographic Centre (CELADE), *loc. cit*

[44] M Nag, *loc cit*

gamy. Polygamous marriages are no longer likely to have any significance in fertility patterns in many of the less developed countries, if any.

Social change and the family

80. While reductions in mortality have been the most visible manifestation of a change in family composition in response to processes making for modernization, there are some straws in the wind which suggest that many countries in the less developed regions may be approaching a threshold where changes in fertility can be expected—changes that will lead to a reduction in average family size. These straws relate primarily to some of the smaller of the less developed countries and so far there is little positive evidence that the massive countries of Asia have in fact shifted fertility patterns to any important extent. Some examples of decline are to be found in some countries or areas: Sri Lanka, where the birth rate dropped from just under 40 per 1,000 in 1953 to 29 per 1,000 in 1970; Hong Kong, where the rates fell from almost 36 per 1,000 in 1959 to approximately 20 per 1,000 in 1970; the Republic of Korea where the rates fell between 1958 and 1970 from 45 to 30; and Singapore, which showed a decline from just over 44 to approximately 22 from 1955 to 1970. One other remarkable case is that of the Fiji Islands, where the rates have fallen from about 40 in the 1950s to under 30 per 1,000 today. These are very small countries or areas which do not affect to any great extent the total average growth of the whole of the less developed regions; but they may in fact be extremely significant pointers to the direction that might be followed by other countries, many of which have now accepted the principle of family planning and have instituted family policies similar to those that have been tried in most of the countries or areas just mentioned.

81. The extent to which the family in transitional society is being subjected to the forces of change is apparent from a consideration of two or three major social factors. The factors chosen for illustration purposes in this paper relate to education, health and family planning programmes. In all these areas, the State must now come to the support of the family in a massive way.

Education

82. Universal primary schooling is a reality throughout most of the developed countries and also in some of the less developed countries. The goals almost everywhere are to develop compulsory education for every child. Education, once a sphere reserved for a few, is now a goal for which the State has accepted primary responsibility. Yet, the goal of universal education for the children of every family, and the elimination of illiteracy among the great masses of the adult population in many countries as well, seems almost as distant as ever. The reason lies, of course, in the magnitude and the complexity of the task and its continuing intensification by the growing numbers of people. While more persons go to school than ever before, more persons also do not go to school. Nevertheless, the available statistics point to remakable progress in enrolment over the past 20 to 30 years.[45] From 1950 to 1960, the number of persons attending schools and universities increased by 102 million. The rise was even faster over the past decade; between the years 1960 and 1968, the total number of persons enrolled in the three main levels of education rose from about 325 million to some 460 million, an increase of 135 million or more than 40 per cent. This is 100 per cent greater than the corresponding rate of increase in the population of school attendance age, and 135 per cent higher than the world population increase during the period.

83. Despite the increasing numbers in school, the absolute total of children not enrolled in schools increased during 1960-1968 by 165 million, or by 30 million more than the additional contingent of children and adolescents receiving school education. In fact, during eight years in question, the proportion of school age children attending primary or secondary schools rose by a total of no more than 4 per cent in Africa, 9 per cent in Asia and 10 per cent in Latin America. Thus, the least progress was made in some of the areas of greatest need.

84. Another illustration of the nature of the problem now arising from the extremely rapid rates of population growth in the less developed countries is taken from the meeting of the Asian Ministers of Education in Singapore in 1971.[46] While school enrolments in the age group from 5 to 24 years rose by 61 per cent in the eight years from 1960 to 1968, the proportion enrolled among the population aged from 5 to 24 rose only from 25 per cent to only 32 per cent. Although the percentage of adult illiterates in the region fell from 66 to 58, the number of illiterates rose from 322 million to 355 million. It was also estimated that, within the next 15 years, an increase of over 50 per cent in schooling facilities would be required merely to maintain enrolment at existing levels.

85. These few figures illustrate the effect of population dynamics in the transitional situation upon educational needs and the way in which these dynamics impinge upon the welfare of the family. In this setting of massive educational tasks and low *per capita* income, major extensions of public policy are required if the educational situation of families and the population as a whole is to be improved. In education, as with food and other sectors, it is difficult, if not impossible to reverse impinging forces, once growth rates have begun to accelerate due to improvements in mortality. The problems assume such vast proportions that they must be solved by public policy; a *laissez faire* approach only exacerbates the situation. While the main motivation

[45] The figures that follow are based on data given in United Nations Educational, Scientific and Cultural Organization, "Population and education", *Population Debate*, vol. I, part four.

[46] *Ibid.*

for expanding public investments in education may be social responsibility to the family, without reference to its size, literacy and education may themselves be two of the major factors determining family size because of their influence upon fertility. For example, among countries with literacy rates of over 85 per cent, the average birth rates are below 20 per cent By contrast, practically all countries with a literacy rate below 40 per cent still have birth rates above 40 per 1,000 These figures suggest that a high level of literacy may be a necessary prerequisite of the successful implementation of policies directed towards reducing family size. Lastly, literacy is an indispensable aid to population education, for it facilitates the easy spread of new ideas and perspectives, including those relating to family planning and birth regulation

Health programmes

86 Achievements in education are also related to the efficiency of health programmes Health measures in the less developed countries have been major factors in the substantial decline in their death rates, particularly from infectious and parasitic diseases In many cases, these results could be achieved by massive environmental action without specific impact upon the family, for example, by the introduction of DDT and the elimination of malaria But other measures of health development which are intimately associated with the family depend largely upon the capacity of the health workers to communicate with individuals or the family Thus, maternal welfare is related to intimate communication between health workers and the mother

87. The reduction of infant mortality is also related to the capacity of health workers to communicate with the mother. The dissemination of knowledge concerning family planning programmes is facilitated by functional literacy on the part of the parents The ability of health workers and medical staff to instruct the mother in family planning methods during the post-partum period of care is one of the most effective ways in which new attitudes towards family size and family spacing can be inculcated [47] This also is facilitated by literacy Thus, health and education are closely interrelated in the formulation of effective population policy Just as education may stimulate new values with regard to society and the family, so health improvements may provoke new concerns about the welfare of the children of the family in a way conducive to reducing fertility levels. [48] The World Health Organization made relevant comments as follows:

"It is postulated that with health improvements, there is a threshold when birth rates reach the low twenties, beyond which the effects of maternal and child health and survival as forces influencing fertility will be superseded by other forces. From the limited evidence now available from field research, the indirect attitudinal effects of health on population may be more potent than the direct effects Expectations of child survival appear to be part of a subconscious orientation towards the future, based in part on the mortality experience of siblings and friends during each individual's own childhood

"It is likely that the first effect of economic development is merely to permit parents to have the greater number of children that their pro-natalist traditions would encourage The eventual close association between better economic status and low fertility appears mainly to have been mediated through secondary attitudinal changes associated with modernization and the increasing ability of parents to plan ahead for their families Such an orientation is clearly influenced by education, social and political developments, availability of resources and better health " [49]

Family planning

88 One of the most significant elements of public policy in the less developed countries over the past few decades is public support for policies designed to alter the pattern of birth rates in populations These policies and the programmes that implement them are new, and, while there has been much question as to their effectiveness, it may be too early to expect them to have yielded marked results [50]

89 India was the first country to move towards a positive policy the purpose of which was to reduce the rate of natural increase In the international sphere, progress was at first slow, but a breakthrough occurred in 1964 when the thirty-seventh session of the Economic and Social Council of the United Nations called for the intensification of assistance to Governments of developing countries to cope with population problems confronting them, and in 1966, the General Assembly fully endorsed an expanded programme of activities in the field of population, including the provision of information and advisory services on request An increasing number of Governments of the less developed countries began to seek advice on appropriate policy and to establish programmes By June 1971, 24 devel-

[47] World Health Organization, "Health trends and prospects in relation to population and development", *Population Debate*, vol I, part four

[48] For an appraisal of the effectiveness of health measures in reducing population pressures, see Joe D Wray, "Popu-

[49] World Health Organization, *loc. cit*, para 147 (*b*) and (*c*)

and others, eds, *Family Planning and Population Programs*,

oping countries had official policies to regulate fertility and implement family planning programmes. While there were still some 55 less developed countries with no specific programme, and 23 of those which had declared support for such a programme had taken no action, the important fact was that the 24 countries which had acted by 1971 covered almost three quarters of the population of the developing countries. In East Asia, the coverage was 96 per cent of the population, and in the balance of Asia it was 86 per cent. Action covered only a minority in Africa and Latin America. It is noteworthy, too, that these endeavours have had significant international support. This includes international aid through the United Nations Fund for Population Activities (UNFPA) and from other United Nations sources, major financial assistance from private foundations and direct bilateral aid from several Governments. By January 1974, 45 developing countries had integrated family planning into their health services, though in a large percentage of the cases this represented health policy rather than population policy.

90. The family planning programmes of these countries must be considered only one facet of many extended activities of the Governments of the less developed countries in terms of the social welfare of their populations. It is often asserted that the family planning programmes are basically concerned with improving human welfare and not *per se* with reducing birth rates; but there can be little doubt that the complete range of activities now being carried by so many Governments have as their objectives improvements in levels of living and in family welfare (partially through a reduction of unwanted pregnancies) and a reduction of completed family size more in accord with the desired family size as expressed through many of the surveys that have been undertaken to test parental opinion in this matter.

Some basic principles

91. In a number of countries, the population policies that have been inaugurated are directed towards specific targets or goals. None of these targets has been the immediate cessation of population growth; such an objective would be unrealistic. At least a doubling of the population in most of the less developed countries is a necessary consequence of past trends and current population structures. Many of the policies articulated and implemented in these countries have been criticized as not giving enough attention to disincentives and measures of a compulsory kind which will compel parents to reduce the numbers of live births. Just how far the State can or should go in such measures is for decision by the individual States.

92. There are many questions as to the capacity of Governments to persuade individuals to alter their motivations and values in such an intimate and complex matter as family formation. Furthermore, measures designed to persuade parents to have smaller families may be accompanied by measures of a more general character that generate social change. Such measures include the redirection of internal migration away from congested metropolitan cities, and employment in non-urban activities on a village basis or in smaller cities. There is also the spread through formal education and the mass media of new approaches by parents at their marriage to the spacing of children and smaller completed family size.

93. Certain basic principles exist, many of which are now generally accepted and which should constitute overriding considerations in the development and implementation of social and population policy. These may be summarized as:

(*a*) The right of parents to determine freely and responsibly the number and spacing of their children;

(*b*) The right of children to education and, indeed, the right of parents to literacy. As already indicated, this right to education may in fact prove to be a very powerful weapon affecting the size of the completed family in a changing society;

(*c*) The right of women to employment on a basis of equality with men. Again, it is not known exactly how the expanded employment of women or their equality in terms of wages and conditions would affect average family size, but this right is now being more widely accepted as a basic principle in a great many countries;

(*d*) The rights of women pertaining to marriage and the family. There appears to be very wide acceptance of the view that women should not be betrothed by their parents, but should have the right to choose their own marriage partner. It is also widely accepted that women should have rights in respect of the dissolution of the marriage, the welfare of the children in a situation of divorce and in the inheritance of property.[51]

94. In this section, emphasis has been placed upon the way in which a social policy directed towards the welfare of the family impinges upon a very wide range of social and economic services in a developing community. Fundamental to a policy designed to improve the condition of the family are the social aspects of development, particularly those connected with improvements in infant welfare and the introduction of effective health services that include infectious disease control, maternal welfare services, and child health services.[52] Not considered here, but also important in terms of the burdens which the family has to carry in a transitional situation, is public policy designed to provide adequate care to the aged.

95. Another area deserving of attention is the interrelation between family policy and the economic aspects of development.[53] Market expansion induces mobility

[51] United Nations Secretariat, "Women's rights and fertility", *Population Debate*, vol. II, part seven.

[52] For a discussion of health policies and measures in relation to family planning efficiency, see World Health Organization, "Health and family planning", *Population Debate*, vol. II, part eight.

[53] A useful discussion of the possible interrelations of economic factors and changing family size is found in Richard A. Easterlin, "The effect of modernization on family reproductive behaviour", *Population Debate*, vol. II, part six.

among groups that participate in the expansion of economic activity and, hence, promotes the growth of consumption and changes in its patterns This expansion also leads to the political mobilization of the large masses who have participated only marginally in the market economy. Both processes tend, through intermediary channels, to lower reproduction rates, and to reinforce secular values that emphasize the need to defer immediate gratification Increased participation of groups in the expanding economy has, as a corollary, greater incidence of internal migration and, among other things, greater employment of women outside the home in non-agricultural activities Hence, policies which influence these processes are, indirectly, family policies and, as such, should take account of family well-being

96 Some of the policies that have been outlined in this section have been criticized by certain scholars as having so far been relatively ineffective in countries in which they have been applied. As previously stated, some of this criticism may be unfair because it might imply carrying the intervention of the State beyond the limits permitted if the human rights described so far are to be preserved On the other hand, some of the criticism may be justified, because inadequate attention has been paid to the necessary process of interrelating population measures within broader aspects of economic and social development The problems are indeed complex.

97. However effective social policies may be over the next decade or so, there is no doubt that the countries now in this transitional phase will provide the greater part of the world's growth between now and the end of the century As a corollary of this, and in view of the current size and composition of population in these regions, it is naturally to be expected that the greater part of the increase in the households of the world's population will also occur in these less developed regions.

98 Under the United Nations medium assumptions, it is indicated that households in the less developed regions will increase from the current level of around 59 per cent of the world's total in 1970 to about 63 per cent in 1980, and about 64 5 per cent in 1985 The number of households in the less developed regions has been estimated to have grown by 14 2 per cent during the period 1965-1970, as compared with only 9.3 per cent in the more developed countries During the period 1970-1975, the number of households in the less developed regions will increase by 12 8 per cent in contrast to 9.7 per cent for the more developed regions During the next five-year period, 1975-1980, a 15 5 per cent increase is predicted in the less developed regions compared with only 9 2 per cent in the more developed The corresponding figures for the final period, 1980-1985, are 16.1 per cent and 8 4 per cent.

99 Thus, it is evident that, other things being equal, the already serious housing shortages and inefficiencies in social welfare among the less developed countries will be further aggravated by population pressures; and that, consequently, massive investments in social policy will be required if the limited progress made so far in such fields as education and family welfare is to be sustained and accelerated, and if housing conditions are to be improved In terms of social as well as economic policy, it is doubtful whether any single nation can stand alone, in the light of the prospects for the universe

Traditional societies and the family

Definitions

100 Traditional societies have been defined as national and subnational groups that have not yet felt in an important way the impact of modernization Owing to world-wide communications and international co-operation, however, there are few societies that can be so characterized today Though many are, in fact, essentially traditional, most have been exposed to and influenced to some degree by modernizing forces Thus, "traditional" is used here mainly as a relative, and not as as exact, description An appropriate definition of modernization for present purposes is clear evidence of the first phase of the demographic transition, that is unmistakable evidence of major improvements in mortality and in the expectation of life at birth Recent demographic history indicates that, currently, such improvements in mortality are generally achieved by improvements in public order and administration, agricultural productivity, basic sanitation and health programmes and the application of scientific technology to eradicate or minimize the incidence of infectious and parasitic diseases None of these factors requires to any appreciable extent improvements in real income *per capita* or major changes in the distribution, structure or organization of society, although their successful introduction does depend upon a reasonable degree of efficiency and stability at political and administrative levels

101. As emphasized earlier, such changes in mortality do release forces that initiate major changes in the structure of families As expectation of life is extended, the average joint life of couples increases, thus establishing a family situation that may encourage an increase in the average number of children born With infant mortality improvements, which are generally most in evidence in the early phases of mortality decline, more children born live through the years of dependency thus increasing the size of the household and adding to the economic and social responsibilities of the community, but not necessarily of the parents In the light of the sustained and often rising level of fertility, along with declining child mortality, increases occur in the numbers of young people entering the labour force, thus intensifying the pressure for additional employment opportunities in agriculture and

diversification of economic opportunity, particularly in non-rural employment, which tends to be associated with accelerating urbanization. Lastly, with the improvements in average life expectancy, the proportions of aged increase and both family and society are required to adjust to and deal with the problems and conditions peculiar to this group.

102. What then might be taken as an appropriate measure distinguishing the traditional or pre-modern from the transitional? A United Nations report gives figures for expectation of life at birth which indicate both the magnitude of the improvements in mortality in recent times and the differential which still exists between major regions:

	Expectation of life at birth			*Years added 1935-1939–1965-1970*
	1935-1939	*1950-1955*	*1965-1970*	
World total	35	47	55	20
More developed regions	55	64.6	70.3	15
Less developed regions	About 30	42	51	21
Europe	58	65.4	70.7	13
Northern America	62	68.7	70.5	9
USSR	47	61.7	70.3	23
Oceania		65	68	—
Latin America	About 40	52	60	20
South Asia	About 30	41	48	18
East Asia	About 30	45	60	30
Africa	About 30	38	43	13

SOURCE: United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *Population Debate*, vol. I, part two, table 4.

103. In the absence of reliable statistics for many countries, especially within the less developed regions, the last column must be taken as only a very rough approximation, but the average number of years added throughout all the major regions cited is most impressive. The most marked increases tend to occur in the regions that started from the lowest base in 1935-1939, while the smallest increase was registered in North America, which had the highest expectation in the base period. In the context of the family, this means that the greatest impact of mortality improvement occurs in the initial phase of change from traditional to transitional levels; and that once average life expectancies have achieved a level of 60 or more, the effect of further improvements is likely to be relatively unimportant since, at this level of life expectation, birth rates seem to have dropped below 30 per 1,000, or, in other words, the small-family system will already have been firmly established.

104. In terms of mortality improvement from a low original base in 1935-1939, by far the most disadvantaged region is Africa, with an average expectation in 1965-1970 still estimated to be only 43 years. Indeed, the regions of Africa south of the Sahara provide the only cases where expectation of life is below 40 years: western Africa with 39 years; and middle Africa with 41 years. However, if reliable statistics were available in appropriate detail, there is no doubt that other smaller areas could be found where life expectancy was still very low, perhaps as low as 35 years.

Some regional illustrations

Tropical Africa

105. In the context of the family, these figures suggest that the traditional demographic patterns of family structure influenced by high fertility, with the high growth potential substantially cut back by high mortality, are now the exception rather than the rule, at both regional and national levels, and are mostly to be found at subnational levels among the most socially deprived and economically disadvantaged sections of the countries broadly classified as less developed. Certainly, where mortality levels are high, fertility levels also seem to be high, but there are areas where high mortality is caused less by a lack of food or access to good agricultural land than by an absence of adequate medical and public health services. Where land resources are felt to be adequate, the population problem appears occasionally to be interpreted as a lack of children rather than a surfeit of them. This seems to be the case, for example, in some parts of tropical Africa. As noted with reference to Ghana:

"Children are greatly valued and the social and political institutions make it not only possible but desirable and praiseworthy for a woman to bear children all through her procreative years. The institutional factors operating through some intervening variables such as low age at marriage and absence of permanent celibacy are largely responsible for the observed high fertility levels. Modern changes have

not as yet altered the traditional social structure to such an extent as to initiate a decline in fertility As children are highly valued, not only by the parents but also by the members of the lineage, where influence in the local activities depends to some extent on their [illegible] habits is [illegible] organizat[illegible] Ghanaian rural social life "[54]

106 What is said here of Ghanaian women probably applies still to much of tropical Africa (although there may be some early signs in some countries of changes in fertility patterns) and in most of these countries the extreme subsistence pressure from high man-land ratios (a major problem through much of the ECAFE region) do not apply

107. As stated earlier, the highest known fertility level measured by accurate statistics appears to have been those of a small group of Hutterite women in the United States of America. The average completed family size (number of children ever born alive) of Hutterite women who had married in the decade 1931-1940 at 18 years of age was estimated in 1953 as likely to be 12 3 children, and the average number of children born to Hutterite women by age 45-54 in 1950, whatever their marriage age, was 10 6 Few other averages have been found beyond about seven children and some of the highest of these are found in tropical Africa.[55] Consider, for example, the following estimates

	Estimated births per 1,000 of population	*Total fertility per woman*
Dahomey (1961)	49	6 4
Ghana (1960)	50	6 5
Niger (1960)	58	7.7
Sudan (1955-1956)	49	7 3
Zambia (1963)	49	6 9

108 These fertility levels suggest that there was little restraint in these societies with regard to marriage and procreation In most of them, marriage—whether legal or consensual—tended to occur between about 16 and 19 years, with about 95 per cent or more married between the ages of 20 and 34, and there were few customs that prevented conception In respect to fertility, at least, these societies could be classified as "traditional" rather than "transitional". Their mortality patterns also were very high, with infant deaths per 1,000 live births almost certainly exceeding 200. Yet these infant death rates were probably considerably lower than they had been and all the countries listed above were experiencing a quite rapid rate of growth, and as one scholar wrote:

"In some areas . the rate of natural increase has apparently already reached about 3 per cent per annum tropical Africa is now beginning to encounter the whole range of new problems that other developing countries know very well—the barriers to social and economic progress that come with extremely rapid population increase."[56]

Until very recently, and probably even today, tropical Africa has contained groups less exposed to the processes of modernization than anywhere else, but even here, downward trends in death rates indicate that these groups may be moving quite rapidly from the traditional to the transitional situation Further evidence supporting this comes from studies which have found some early signs of decreases in family size among the less poor and better educated sections of some urban areas

Pakistan and Bangladesh

109 Tradition favouring a large family is generally associated with the Moslem faith, though it is difficult to validate this point Male succession is certainly important and, as in the Hindu societies, marriage age tends to be extremely low. But, in the formal sense, there seems little in the Moslem religion that is opposed to birth control and a number of Moslem countries have already implemented policies designed to reduce birth rates Pakistan took such action nearly two decades ago,[57] but the birth rates in Pakistan and in Bangladesh remain high, possibly around 48 and 50 per 1,000, respectively But it is impossible to determine, for these countries, the extent to which the large family ideal is sustained by traditional factors or whether there is a lack of motivation linked with the limited advance in economic and educational conditions It is noteworthy that a decline of fertility has been observed in pockets of these countries

The threshold hypothesis

110 Although traditional *mores* with regard to the family may still be strongly entrenched, there are few areas left in the world in which the traditional or pre-modern family structure, with high fertility, substantially matching mortality, and therefore slow growth rates, remains wholly intact Almost all countries have felt the impact of substantial mortality decline and therefore also of expanding growth rates This trend has been so recent that it is hardly surprising that there has so far been only a limited reaction in terms of fertility change Falling mortality has not yet produced an impact for as long as one generation, and it is of some interest to speculate that any major change in family structure is unlikely to occur until the current young generation has grown to maturity Moreover, if signs of change in patterns of marriage and in family formation and size do occur, their origins are likely to be concealed for a considerable time

[54] S K Gaisie, "Some aspects of fertility studies in Ghana", in J C Caldwell and C Okonjo, *The Population of Tropical Africa* (London, 1968), p 245

[55] A J Coale, "Estimates of fertility and mortality in tropical Africa", in J. C. Caldwell and C. Okonjo, *op. cit*, pp 182-183

[56] A J Coale and others, *The Demography of Tropical Africa*, 1968, p 186.

[57] W. D Borrie, *op cit*, pp 257-258; see also *Measures, Policies, and Programmes Affecting Fertility,* [illegible]*icular Reference to National Family P*[illegible] [illegible]*nited* Nations publication, Sales No

because of the inadequacy of statistical data and the manner in which data are generally presented on a national basis.

111. It has been documented that the average length of time required for a country to pass through the stage of demographic transition associated with a decline of fertility (from a birth rate of 35-40 or above to one of about 20 per 1,000) has been reduced, from some 50 years for countries entering the transition in 1875-1899, to half that time or less for those countries entering the transition about 1950.[58] Moreover, many of the less developed countries now also have higher *per capita* incomes and literacy levels and a greater proportion of population employed in non-agricultural work than many European countries had when they began their transition. Kirk suggests that they may therefore be close to a "threshold level" at which fertility decline begins. The decisions that will determine the threshold will be made by the rapidly increasing numbers of young persons now growing to maturity, most of them in the regions briefly surveyed in this section. As it has been phrased, the demographic spotlight should be focused (in policy terms) on youth now aged from 15 to 24. According to Taeuber,

> "In the decade of the 1970's, the normal sequences of the life cycle include a job or economic placement of some type; marriage and the introduction of a new couple in an extended family or the formation of a conjugal family; initial and continuing or controlled parenthood; and the rearing of children who do or do not have opportunities for physical vitality, school attendance, and broadening social contacts. Programs for population control that proceed apart from economic development, social change, education, and the initiation of transformations in families are unlikely to achieve the avowed goals of rapidly declining rates of population growth."[59]

National goals and the family

112. The family is the basic social group. Its responsibilities include the bearing and rearing of children, and hence it provides continuity and change from generation to generation. External forces and developments impinge upon and transform the family. The changing family in turn alters the numbers, characteristics and aspirations of on-coming youth. The goals of countries for the welfare of their people are thus goals for families as well as for individuals and larger groups. Hence, it is the family that is the locus of integration for demographic, social and economic developments. Transitions in population dynamics are family transitions: economic and social developments are family transformations. Once the processes of economic and social development have been set in motion, fundamental changes occur in the structure of society. There are extensions of job opportunities for bread-winners, and there are requirements of literacy for those who have to be trained for the increasing range of occupations. The population that is surplus to rural needs moves in search of non-rural employment. A sharp decline in mortality generates increasing population growth until commensurate declines occur in fertility. All these changes exert pressures on the family to adapt to altered circumstances. In this process, public responsibilities for family welfare assume new dimensions.[60]

Mortality control

113. All countries have the goal of reducing mortality levels where these are high and of sustaining and further lowering mortality levels where they are already low. There is acceptance of major public responsibility through public health programmes to reach these goals. In many countries, the major objective of policy is still the reduction of infant and child mortality; there is clearly a differential between infant mortality rates of 15-18 per 1,000 live births in the most developed countries, and rates of 100 and even higher rates of infant mortality in the least developed of the developing countries. National and international efforts to achieve further improvements continue to have high priority in public health policies.

114. A corollary of the concern for reducing infant mortality can be found in maternity welfare. This remains a high priority area for public action in countries with low degrees of literacy, inadequate housing and insufficient income.

Development and resource allocation

115. The capacity of public policy to provide the finance and skilled personnel for achieving reductions in mortality depends upon national income sufficient to include these objectives along with other aspects of public policy. Another goal of national policies that seems to be universally accepted is the continuation of development processes in order to improve the quality of life.[61] Such improvement is generally expressed in terms of raising national and *per capita* income. It has recently been argued that this index is not an adequate measure of welfare, unless it includes some measure of the distribution of income as well as its absolute amount.

116. There appears to be concern in some developed countries about the relations between higher levels of welfare and continuing improvement in real *per capita* incomes. Efforts are being made to find social indicators that provide more adequate measures of the quality of life. It has been suggested by some that the affluent societies should reduce development in order to lessen the drain on non-renewable resources of the world.

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[58] Dudley Kirk, "A new demographic transition?", in National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications* (Baltimore and London, Johns Hopkins Press, 1971), pp. 123-147.

[59] I. Taeuber, *loc. cit.*, pp. 88-89.

[60] I. Y. Matyukha, *loc. cit.*; and S. Polgar, *loc. cit.*

[61] For a fuller statement see, "Population change and economic and social development; report of the Secretary-General." *Population Debate*, vol. I, part one.

Some who pursue this thesis tend also to argue against a more rapid development in the less affluent countries, since this also would raise the consumption of non-renewable resources Some conclude that the prospective doubling of the less affluent populations makes it impossible for the less developed countries to achieve levels of command over resources and industrialization comparable to those in the developed countries [62] Whatever the goals of the future are, they will have major repercussions on family consumption of food and other necessities, and will influence the size of family that should prevail if growth is to be kept within reasonable bounds It is sometimes argued in relation to the more developed countries that a situation of zero population growth should be achieved as quickly as possible, and even that some decline in population should be the objective, and that public policy should be so designed as to provide the necessary disincentives to encourage parents to reduce average completed family size to two or even fewer children [63] For a variety of reasons, reduction in family size to this level in the less developed countries from their current averages of five or more children per family cannot be quickly achieved Social policies should be designed now that would discourage the bearing of large numbers of children poorly equipped to deal with the hazards of life and incapable of contributing to the advancement of society, instead, social policies should be implemented that would encourage the bearing and rearing of fewer children for whom it will be possible to ensure greater well-being Thus, the groundwork for the well-being of family and country will be laid along with the basis for achieving a zero population growth rate.

117. What, then, is the response in the less developed regions to these arguments? Certainly, few Governments of less developed countries would be prepared to forgo policies that would give them access to an increased share of the world's resources, for example, of energy and minerals It is evidently considered that the pessimism of affluent countries may mark the beginning of pressures upon the poor countries, both to hold back their economic development and to restrict their populations, on behalf of environmental preservation as interpreted by the affluent societies

A basis for family policy

118. Policies relating to the family and population are the responsibility of national Governments, but international declarations can recognize broad prin ciples, taking into account national sovereignty Sucl recognition was clear in the Stockholm Declaration o the Environment [64] The right of national Government to determine their own policy with regard to the famil was also apparent in the Declaration emanating fron the Second Asian Population Conference held in Toky in November 1972 [65] This Declaration, supported b the countries of the United Nations Economic Com mission for Asia and the Far East (ECAFE), i reproduced in the annex, because of its importance a the most advanced step yet taken towards an interna tional declaration of basic principles relating to th family and population growth The Declaration clearl recognizes the responsibility of society for the welfar of the family It gives full recognition to nationa sovereignty in the planning of social policy for th welfare of children and parents, but it emphasizes th responsibility of Governments towards the economic ally, socially and educationally disadvantaged amon their peoples It acknowledges the importance of poli cies that disseminate information concerning famil planning in order that parents may exercise responsibl their right of choice with regard to the number an spacing of their children It is also the first declaratio in which Governments of the ECAFE region endorse the desirability of encouraging small families throug intensive policy efforts in the fields of education, socia welfare and economic organization

Interrelations between family policy and other aspects of social change

119. Other significant international statements con cerning the responsibilities of Governments and socie ties towards the family support the objectives set ou in the Declaration of the Asian Governments Th Regional Seminar on the Status of Women and Famil Planning for Countries of the Western Hemisphere which met at Santo Domingo, in May 1973, noted tha family planning had been universally recognized at th international Conference on Human Rights at Tehera in 1968, with the proclamation that couples had th right to determine "freely and responsibly the numbe and spacing of their children", and recommended tha the United Nations General Assembly should be calle upon to proclaim family planning as the basic huma right of every individual prior to the World Populatio Year in 1974. [66] While it might be argued that a con ference devoted to family planning could hardly b expected to come forward with a declaration that di not positively support it, the statement is further evi

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[62] See P R and A H Ehrlich, *op cit*, and D H Meadows and others, *The Limits to Growth, A Report for the Club of Rome's Project on the Predicament of Mankind* (London, 1972, also New York, New American Library, 1973) For a strong rejoinder to the pessimistic view taken by the abovementioned authors, see John Maddox, *The Doomsday Syn-*

[64] *Report of the United Nations Conference on the Huma Environment, Stockholm, 5-16 June 1972* (United Nation

dence of the breadth of support. In these contexts, family planning is seen not as a mechanism for deliberately reducing the number of children, but as a means of emphasizing the right of couples to eliminate unwanted pregnancies, which, in most cases, would mean limiting family size to numbers that can be adequately supported. However, in much of the less developed world, the motivations of the masses to take advantage of available family planning services are still extremely weak, largely because of the lag in other aspects of social and economic development associated with the improvement in the status of the family itself, such as literacy, education, adequate nutrition and adequate housing.

120. In June 1973, a regional seminar on the status of women and family planning was convened at Jakarta, Indonesia.[67] This meeting also drew attention to the problems pressing on the family and the status of women as a result of the rapid and rising rate of population growth in the ECAFE region. It noted that "the current and future trends of population size, growth, composition and distribution in the region have very serious implications both for economic and social development and for the status of women". Further, "Despite the efforts made to increase both the quality and the quantity of educational facilities, employment numbers, food production, drinking water and housing, the rapid growth of population is making this task difficult, and seriously threatening the prospects for the advancement of women at the present time."

121. In addition, the point was made that the status of women is a significant factor influencing family size, and that family planning offers an important means of raising the status of women and of enabling them to participate actively in the creation of the conditions necessary to enable both women and men to enjoy the rights to which they are entitled as human beings.

122. The seminar issued a number of recommendations bearing directly upon the welfare of the family. It called upon Governments to implement the provisions of United Nations Conventions and Declarations directed towards establishing the principle of equal rights of men and women, and also to carry out other measures, namely:

(*a*) To review or enact national legislation that might have a bearing on the status of women and family planning;

(*b*) To ensure that the minimum age of marriage for women should be not less than 16 years;

(*c*) To encourage women's organizations and other civic and educational bodies to promote and support the acceptance of a later age for marriage for girls and for the right of free choice of spouse;

(*d*) To promote legislation to ensure that women and men have equal rights at marital dissolution;

(*e*) To enforce monogamy;

(*f*) To establish equal rights as to property inheritance;

(*g*) To create community centres and other institutions in villages and in urban neighbourhoods through which programmes of education, vocational training and recreation can be channelled to out-of-school young people and adults;

(*h*) To include education in population matters in school curricula.

While the seminar was concerned primarily with the welfare of the family, it also recognized that the measures recommended might well have an effect on family size and drew attention particularly to the necessity of reducing the high rates of infant and child mortality that still prevail in many countries. It was considered that these high rates also motivated couples to produce many children, and that it was unlikely that couples would limit family size until they could be assured of the survival of their children to adulthood. Lastly, the seminar also supported the concern expressed at the Conference at Santo Domingo concerning the widespread recourse to abortion in many countries as a means of limiting family size, and recommended that "governments give very serious attention to this problem and take all possible steps to reduce the number of induced abortions or eliminate them". This Declaration was followed by a strong plea for adequate family planning services and the establishment and expansion of child care facilities along the lines referred to above.

The goal of small family size

123. There seems to be growing concern in many less developed countries in favour of positive action for family planning. None of the proposals of the conferences mentioned above nor of the Symposium on Population and the Family were directed towards a specific target of total population, or a specific rate of growth.[68] However, from the discussions and recommendations of these meetings, it is evident that social change has already produced a climate of opinion which, though hardly universal, will permit the adoption of policy measures to influence both family formation and ultimate family size in a vast majority of countries. The implication is that the peoples of many developing as well as developed countries will accept policies directed towards reducing family size and bringing about lower rates of population growth.

124. Many surveys have been conducted to ascertain the attitudes of parents towards family size. In the less developed countries, most of these studies have indicated that the numbers of children actually born exceed the numbers of children ideally desired, fre-

[67] "Conclusions and recommendations of the Regional Seminar on the Status of Women and Family Planning", Djakarta, Indonesia, 20-30 June 1973 (ESA/SDHA/AC.2/21).

[68] See "Report of the Symposium on Population and the Family", Honolulu, 6-15 August 1973, *Population Debate*, vol. II, annex III, paras. 69-86.

quently by two children.[69] Exceptions to this proposition are still found in some parts of tropical Africa where both fertility and mortality continue to be extremely high. Still, it is difficult to know whether in Africa this may be attributed wholly to culture or whether it is in fact the response to mortality rates which give expectations of life at birth which are frequently below 40 years In this situation, generation replacement requires a large number of births per family But in the vast majority of cases the conclusions of surveys in less developed countries support the thesis that the implementation of the development measures mentioned earlier will alter values in respect to family size, so that parents will desire and achieve smaller families

125 Little need be said in this section with regard to the more developed countries In most cases, family size is already below an average of three children and still declining [70] In some countries in which fertility again appears to be dropping below replacement level, Governments are considering measures to stimulate births, but there is no evidence that any Government wishes to sponsor families of a size that would bring a return to rapid rates of population growth On the other hand, neither is there evidence that any Government is ready to accept a population decline A summary of the current situation and a possible pointer to future attitudes, should fertility fall to the point where replacement is in doubt, may be found in a statement from the Second European Population Conference, held at Strasbourg in 1971·

> "Over the past century fertility in western Europe has been steadily declining and seems to be converging within a fairly slender bracket of between 2 3 and 2.7 births per woman among the generations reaching reproductive maturity after the war, declining still further in the most recent generations The situation appears to be growing more homogeneous in terms of space, time and the social hierarchy as though the family were approaching a model, a standard pattern ... More women are marrying than formerly They do so younger than they used to and it is more exceptional for them to remain childless.... The timing of marriages and births has to some extent become concentrated around younger ages ... more than one-half of lifetime fertility is completed after five years of marriage, and over four-fifths after ten years "

The report then suggests that the time may have arrived when a policy to revive the birth rate is required [71]

Human rights and the family

126 More detailed consideration of current thinking and relevant policy measures in developed countries was provided in previous sections of this paper In conclusion, it is emphasized that marriage and family formation, whatever form they take, whatever the size of the family, and whatever the economic and social status of the country and its people, involve basic human rights now widely accepted by the States Members of the United Nations Examples are declarations calling for equality between men and women in all areas of law, political life, education, marriage and the family, and seeking the eradication of prejudice against women The matter has been summarized thus

> "These comprehensive goals are relevant not only to the expansion and protection of basic human rights, *but to the analysis of the association between various* aspects of the status of women and demographic patterns of fertility, mortality and migration Fertility, and the social processes associated with it, are of special importance in this regard The status of women may be seen as both a determinant and a consequence of variations in reproductive behaviour A woman's health, education opportunities, employment, political rights and roles in marriage and the family are affected, and in turn are affected by, the timing and number of her children and by her knowledge of how to plan them The impact of birth planning on the individual woman's potential for personal autonomy and for participation in all sectors of society—that is, the human rights aspect of the relationship—is clearly as important as the question of the impact on fertility of improvements in her status, which may be of greater interest from the demographic point of view "[72]

127 It is difficult to know whether or to what extent these declarations of rights with respect to such matters as the number and spacing of children, employment, education and so on, directly affect family structure, but they are important in clearing away doubts if and when national developmental policies provide the economic and social bases for the exercise of these rights Hence, the right to employment can only affect the size of the family if economic development provides the employment opportunities, and if there is a negative correlation between educational status and family size, as appears to be the case, it is not the declaration of the right to education which solves the problem, but only the provision of the opportunities for education

[69] Dudley Kirk, "Factors affecting Moslem natality", in [illegible]

[illegible]

	c 1961	c 1971
New Zealand	26 5	22 5
Australia	22 4	20 0
Canada	26 7	17 6

[71] Council of Europe, Second European Population Conference, 1971, *Report on the Relation Between Fertility and the Social and Economic Condition of the Family in Europe* (New York, Manhattan Publishing Company), vol III, pp 140-147.

[72] United Nations Secretariat, [illegible] ; fertil [illegible] *loc. cit*, para 2

But declarations do clear the way and they do serve to protect from the outset the dignity of the person, and by implication the family, and they do represent a judgement that discourages Governments or authorities from taking short-cuts to population goals by attempting to manipulate the family and its members in undesirable ways.

Evaluation and policy implications

Implications of current growth patterns

128. This paper has attempted to outline some of the major interrelations between population factors, with particular reference to family formation structure and size on the one hand, and the economic and social forces making for change and stability on the other. These matters were discussed with reference to two broad categories, i.e., the more developed and less developed regions and countries of the world. Broad though such a division may appear, each sector has demographic elements that are unique in human history, and each has definable elements that distinguish it clearly from the other. Neither sector is homogeneous; but each includes varying patterns of population dynamics, the *per capita* use of non-agricultural resources, the proportion of the population living in cities and *per capita* income.

129. The first sector, the more developed regions of the world, is estimated to have contained 1,083 million people in 1970 or around 30 per cent of the world's estimated population of 3,620 million. The remaining 2,537 million people, or 70 per cent of the world's total, were in regions classed as less developed.[73] There is scarcely an element of this pattern that is not unique:

(*a*) The estimated annual rate of growth of the world's population of 2 per cent has almost certainly never been equalled before on a sustained basis;

(*b*) The average annual rate of growth of the less developed regions of 2.4 per cent is certainly unprecedented as an average over large aggregates of people;

(*c*) The estimated rate of growth of the more developed regions of 1 per cent a year is not unique as a rate, but the components comprising it are, as concerns both fertility and mortality.

If continued, these rates of growth will accentuate the problems now associated with over-crowding. Man has probably been on the earth as a cultivator exploiting the world's resources, for about 10,000 years; the possibility exists that at the current rate of population growth and resource use, many vital resources may become critically short within 200 years—some within 100 years. This is not a prediction. The projection of current rates of population growth and resource consumption indicates how serious the predicament may be if rational action is not taken soon to change the course of human population growth. United Nations projections[74] show how far growth rates must be reduced to prevent population from increasing to twice its current level within the early years of the twenty-first century, or within one generation.

130. Hence, Governments are now considering ways to move population growth rates in the directions that are considered desirable in the national interest. The current views of most countries favour a slowing of growth. This is the basic objective in almost every articulated population policy, although there are developing countries, particularly in tropical Africa and Latin America, that view population growth as an asset.

The objective of national policies

131. A policy that is directed towards achieving a specific population goal may be acceptable if it is in conformity with the basic human rights now espoused by the family of nations, and if it can persuade couples to limit their families to appropriate numbers of children. Most policies implemented before the Second World War were in developed countries and were designed generally to increase rates of growth, in situations in which it was feared that national survival was at stake because fertility had fallen below replacement level. Many of the family policies initiated in European countries during the 1930s had this motivation. Few, if any, of them met with conspicuous success.[75]

132. Now, however, most of the policies proposed have the reverse objective. Within the more developed countries, an objective of attaining population stability means reducing average family size by about one third to one half of a child per couple and judging from trends in birth rates and fertility patterns in many of these countries, the decisions of millions of ordinary couples may be anticipating the capacity or need of Governments to introduce additional national legislation in order to persuade their peoples to achieve a particular goal. As noted earlier, few Governments of the more developed societies now see an increase in population growth rates above approximately current levels as a good thing in itself, but none appears prepared to welcome a period of population decline. A major motivation in the argument in favour of zero growth rates is the growing conviction that limiting births contributes to human welfare and, specifically, that the drain on non-renewable resources must be reduced.

133. It is hardly surprising that the majority of the less developed countries should give first priority to economic development, or at least to emphasize that

[73] United Nations Secretariat, "Demographic trends in the world and its major regions, 1950-1970", *loc. cit.*

[74] United Nations Secretariat, "World and regional population prospects", *loc. cit.*

[75] For a general discussion of the development and effectiveness of these policies, see Hope T. Eldridge, *Population Policies: A Survey of Recent Developments* (Population Investigation Committee and the International Union for the Scientific Study of Population, 1954); and W. D. Borrie, *op. cit.*, chap. 10.

a social policy designed to improve the lot of the family through a reduction in the number of its children, and therefore of consumers, can have little meaning unless economic growth is stimulated. Indeed, in many countries the levels of nutrition are still so low that an essential attribute of any policy designed to improve health must be greater productivity, particularly in agriculture.

134. Most of the more developed countries now have comprehensive systems of social welfare that give community support to the family—for example, maternity and child allowances, compulsory education and major provision for higher education and pensions at the end of working life—so that a policy designed to change family patterns can be quite specific. This is not so in the less developed regions, where a policy that successfully prevents births will almost certainly bring economic advantages; but in a situation where infant mortality rates may exceed 100 and even 200 per 1,000 live births, compared with rates of 15 to 20 in more developed countries, or where expectations of life are between 40 and 50 years compared with over 70 in more developed areas, scarce financial resources cannot be allocated to one programme alone, such as family planning

135. The problem facing the developing countries is how to get the maximum welfare efficiency out of extremely slender resources, population control is only one facet of a complex problem.[76] There is such a growth impetus in the cohorts already born in the less developed regions that massive increases in all aspects of social welfare are necessary just to hold things at current levels.[77] Furthermore, a universal goal of all social policies in the less developed regions is the right to long and healthy life as expressed in terms of lower mortality rates and low incidences of morbidity. Hence, a family policy in the less developed countries cannot be confined to a reduction in family size but must be concerned with improving the welfare of family members; reducing family size is essentially concerned with the future, while saving lives is obviously concerned with the present

Defining priorities

136 The whole approach to current policies designed to reduce family size, with particular reference to the less developed regions, had been trenchantly criticized by some sociologists and educationalists One criticism, for example, is that family planning programmes that are purely biomedical in approach and negative in goals do not change the motivations of parents for having children and do nothing to change such basic aspects as the structure of the family, the role of women and the sexual mores Those who argue thus appeal for more positive measures which wil clearly and specifically be designed to discourag marriage, to raise the age of marriage and reward non familial rather than familial roles. Some have suggested as positive disincentives, that Governments should offe monetary incentives for sterilization (as in India), tha they should bear all the costs of abortion and that ta systems should be constructed to provide disincentive rather than incentives for childbearing (a principle tha now seems to apply to some aspects of the tax structur of Singapore).[78]

137. A policy that provides for penalties may b appropriate as helping to encourage or persuade parent to forgo the birth that exceeds desired family size. Bu the emphasis on disincentives for the less develope countries raises two problems first, policies shoul always reflect humanitarian principles, and, secondly such a policy could be effective only if, through rea *per capita* growth, conditions were created whereb economic incentives or disincentives would have rea meaning in policy terms. The problem has been phrase succinctly, as follows·

"In most pre-modern situations, the typical househol feels little need to regulate fertility because unde the prevailing circumstances of high and widel fluctuating mortality, the prospect of having th number of children desired is very uncertain Modernization, however, shifts the typical househol situation to one in which the potential output o children is considerably larger than the numbe wanted With the growth of unwanted children as serious problem, there emerges a motivation t regulate fertility Thus, while the forces of modernization lead on the one hand to greater motivatio to limit fertility, on the other, they make fertilit regulation easier by lowering its subjective an market costs Eventually the balance between motivation for and costs of fertility regulation tips in favou of the practice of fertility control Fertility, which wa heretofore governed by the biological factors an social practices determining natural fertility, become a matter of individual choice by the typica household As long as fertility control costs ar positive, there will continue to be some unwante children, but in the course of time actual family siz tends to converge towards desired family size Fertility has left the biological and social field t become part of behavioural science."[79]

138 If policy to change family size needs to b multidirectional and multidisciplinary in its approach what should be its ingredients? The following summarizes some of the features that may be basic to a famil policy:

[76] For a discussion of the necessary interactions between [illegible]

[78] For a general discussion of these aspects, see W. D Borrie *loc cit*

[79] R Easterlin *loc cit* (quotation from preliminary versi This subject is discussed in paragra hs 63 a of the re paper

(*a*) It must recognize the place of traditional *mores* and customs with regard to marriage, the birth and rearing of children and the care of the aged. These customs are likely to be strongly entrenched in the rural sectors of society in which the majority of the populations of the less developed countries still lives and finds its livelihood;

(*b*) Closely related to the first point is the fact that a family policy must take into account existing structures and customs governing households. However, while extended family groups will be still a significant element in some countries, particularly in peasant-type rural societies, there is strong evidence that the nuclear family is overwhelmingly the basic element of household structures; this unit should be the main target of policy;

(*c*) Family policy should be formulated in cognizance of the significant phases of the family life cycle in order to facilitate assessment of the stress points at which the maximum needs for extra-familial assistance will occur. In societies in which the small-family system, i.e., average family size of, say, fewer than three children, has been firmly established, some major stress points may be: marriage and the establishment of a home; the costs of maternity and births which, for the majority of families, occur during the first 10 years of marriage; the period between approximately the tenth and twentieth years of marriage, when the main burden of educational costs will occur; and the post-employment years when regular income has ceased. One study sees the essential phases in the life cycle of the family and household arrangements appropriate to a high fertility society, such as is found in the Philippines, as:

"*First* decade (ages 15-24), when most children are still members of the parental unit and household;

"*Second* decade (25-34), when an increasing number of subordinate units are gaining independence;

"*Third* decade 35-44 and *Fourth* decade (45-54), when a drop occurs in the proportion of independent units being created; in the fourth decade, children have usually moved out of the parental household and the independent married-couple household emerges;

"*Fifth* decade (55-64), when there is an increase of dependent units;

"*Sixth* decade (65 and over), when the number of dependent units reaches a peak." [80]

In this cycle, it is in the first and second "decades" that education and information about family planning will influence family size for it is in them that attitudes are formed and decisions made in respect to reproduction;

(*d*) A family policy should be based upon rights now generally accepted, even if not yet firmly incorporated in formal and universal declarations. Such rights include: (i) the right of adults to choose their own marriage partners; (ii) the right of parents to choose when they shall have children and to determine the size of their families; and (iii) the right of women to be treated on an equal footing with males in terms of such factors as employment, wage rates, divorce and inheritance.

139. Some will argue that the principles outlined in this paper lack a sense of crisis about the population issue, because they lack the essential focus of reducing family size by such positive measures as deliberately raising marriage age and offering disincentives which discourage childbearing. However, in the declaration of the Second Asian Population Conference, Governments of the less developed countries with family planning programmes in operation acted consistently with their culture and in conformity with universal principles of human rights. They see policies directed towards the family as part of the evolution of a new cultural, social and economic environment.

140. One essential and universally accepted aim arising out of these principles that the family should incorporate human rights is that of reducing mortality—an aim which, if achieved, must temporarily increase the size of nuclear households and add to the burdens of parents by extending the life cycle of dependency. Yet it is a basic objective of the social policies of all Governments and so becomes the foundation of all policies directed towards the family.

141. A second objective which is now widely accepted is the reduction of illiteracy through universal and compulsory education, although, as has already been indicated, while progress has been made over the past two decades or so, many countries still have much to accomplish before universal literacy is achieved.

142. A third objective that has wide, but not yet universal support, is that of making family planning information and services available to all families. [81] It has been estimated that a contraception acceptance level of 25 per cent of the women at risk of childbearing is necessary to achieve a major breakthrough in the reduction of fertility but, so far, levels of from 10 to 12 per cent appear to apply in most countries with family planning programmes. [82]

143. However, most of these programmes are of very recent origin and have been confronted with complex problems associated with both motivation and

[80] M. B. Concepción and F. Landa-Jocano, *loc. cit.*, para. 31.

[81] For a review of the nature and extent of such policies, see United Nations Educational, Scientific and Cultural Organization, "Communication in support of population/family planning and development", *Population Debate*, vol. II, part eight; and United Nations Secretariat, "Family planning programmes and fertility in the countries of the ECAFE region", *loc. cit.*

[82] World Health Organization, "Research on the biomedical aspects of fertility regulation and on the operational aspects of family planning programmes", *Population Debate*, vol. II, part eight. The 25 per cent level seems to have been approached in the Republic of Korea and in Singapore, both areas that have achieved a major breakthrough to smaller families; but both are also areas in which there has been concurrent rapid development, making for economic and social change (rising incomes *per capita*, urbanization, high literacy levels etc.); and both have expectations of life in excess of 60 years. What has been cause and what effect with regard to their fertility is still an unresolved problem that will need further research.

techniques. Nevertheless, there seems little doubt that, where they have been implemented, family planning programmes are likely to remain an integral part of social policies.

144. Lastly, economic growth is still the prime motive of Governments in the less developed countries, for without it their goals in the field of health, education and family planning cannot be reached; and the goal of development also means an acceleration of the mobility of the population with regard both to shifts in employment and to residential distribution—both of which tend to strengthen the role of the nuclear family in society.

Universal criteria for a family policy

145. Family policy in the broad sense consists of many strands that are interwoven with the whole fabric of social change Some of its basic elements are as follows:

(*a*) Laws to protect the rights of minors;

(*b*) Laws relating to the legal age of marriage. (In many developing countries, raising the legal age for marriage would have a significant effect on the average completed family size and also on the well-being of the family.),

(*c*) Adequate health care at maternity for all mothers, irrespective of income or social class;

(*d*) Adequate post-natal services, particularly during the first three months of life;

(*e*) Universal and compulsory education beginning between five and seven years of age and lasting five years or more;

(*f*) Public assistance for higher education, particularly of a vocational character, in order to improve the quality of the work force in response to economic change;

(*g*) Public health policies designed, in particular, to provide efficient water-supplies and sanitation and to control infectious and parasitic diseases;

(*h*) Economic policies directed primarily towards improving agricultural efficiency and productivity in order to raise nutritional standards, and having as a secondary aim the diversification of employment opportunities and the raising of real *per capita* incomes;

(*i*) Provision for the aged, which become increasingly necessary as workers move from a subsistence to a market economy, and from rural and village life to major urban centres;

(*j*) Laws, information and services to ensure that individuals and couples may determine freely the number and spacing of their children.

146. Obviously, these and other elements of social and population policy should be implemented with full respect for individual rights and national sovereignty. But conditions in individual countries affect the well-being of all humanity so that although families have a right to determine the number and spacing of their children and countries a right to decide what population and family policy will be advantageous to their society, consideration must be given to the interests of mankind as a whole. The resources of the earth are finite, and conditions in one nation influence directly or indirectly levels of living in another Similarly, the combined decisions of individual families in respect to family size do not necessarily add up to the good of the country. Hence, Governments have the right to induce families, by humanitarian means, to adjust their fertility behaviour to norms appropriate to national well-being, and the international community, with due regard for national sovereignty, has the responsibility to review on a comparative basis the situation that prevails in each country and to recommend to Governments courses of action that will improve the condition of mankind.

147 The magnitude of the problems to be solved should not be minimized· solutions may be found and applied effectively not by countries acting separately, but by further international co-operation. Two hopeful signs are the growing tendency for Governments in the less developed countries to develop social policies with respect to the family, health and welfare, and their willingness to accept technical assistance on their own terms, as well as continued support from the more developed countries through funding and the provision of technical assistance on request, both on a bilateral basis and through international agencies.[83]

ADDITIONAL REFERENCES

In addition to the sources acknowledged in the foot-notes to the text, information was taken particularly from the papers listed below

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Segal, Sheldon J. New developments in the scientific study of human reproduction. In *Population Debate*, vol II, part eight.

Westoff, Charles F. Population and the family overview. In *Population Debate*, vol II, part six

[83] International Bank for Reconstruction and Development, "The management problem in national family planning programmes", *Population Debate*, vol II, part eight

[*Annex. Population strategy for development* follows]

ANNEX

Population strategy for development *

(Declaration adopted by the 23 nations represented at the Second Asian Population Conference held in Tokyo, November 1972, under the auspices of the Economic Commission for Asia and the Far East of the United Nations)

The Second Asian Population Conference,

Having considered the necessity of formulating population policies and programmes as integral parts of the social and economic development process,

Recognizing the urgent necessity of succeeding in efforts for economic and social development for the benefit of the countries and the greater welfare and happiness of all the peoples of the ECAFE region,

Recognizing the human right of every couple to determine freely and responsibly the number and spacing of their children and the need to ensure their access to information, education and the means so to do, no matter what their financial or social condition,

Recognizing further the social and economic impact of individual family size on societies, and considering it appropriate for Governments to take social and economic measures, in addition to family planning programmes, that will make a smaller family more acceptable and beneficial to the individual couple,

Giving full recognition to national sovereignties and to the need for each country to consider the establishment of goals and programmes for an effective control of the growth of population in the light of individual national conditions and policies,

Reaffirming the importance of integrating population into the development strategy of the Second United Nations Development Decade,

Taking note of the Stockholm Declaration and stressing the impact that rapid population growth has on the human environment,

Having considered the fields of concern identified in the report of the present Conference,

Desirous of ensuring that the World Population Conference and the World Population Year contribute their utmost towards the universal resolution of the problems of population and development, bearing in mind the inherent differences in such problems from country to country, and

Emphasizing that the urgency of problems of population growth and distribution calls for intensive and dedicated work in various government sectors as well as innovative changes in many fields,

Declares that

1. While population has a direct effect on economic and social development and the human environment, conversely policies in the fields of education, health, housing, social security, employment and agriculture have an impact on population and, therefore, require integrated national planning and co-ordinating action at the highest government level.

2. It is important that the widespread benefits of economic growth should be ensured through policies and programmes to bring about a more equitable distribution of opportunity and income, with particular attention being paid to health and nutrition programmes to reduce infant and maternal mortality, programmes to achieve full and productive employment, actio to reduce excessive rates of migration to the larger citie measures to improve the status of women, and appropria social security measures.

3. The priority of population and family planning fiel should be recognized through the allocation of broad respons bilities in planning, evaluation and analysis of programmes i these fields to an appropriate organization within the Goverr ments.

4. Governments of the region which seek to fulfil the ideal of their people and their national goals through populatio policies and programmes should:

(*a*) recognize the essential role of population and famil planning programmes as a means of effectively achieving th aspirations of families and their societies and should provid information, education and services for all citizens as earl as possible;

(*b*) encourage small families in rural and urban area through intensive efforts in information and education, wit the help of all relevant institutions and resources and th enactment of appropriate social and economic measures;

(*c*) include in population policy and programmes provision to ensure that all pertinent information reaches the policy makers, opinion leaders and socio-economic planners;

(*d*) encourage the development of new tools of communication and the utilization of existing ones so that knowledge may be shared at all levels of society;

(*e*) consider establishing population commissions or other bodies having multidisciplinary and multidepartmental representation, to assess the current status and future needs in the fields of population and family planning;

(*f*) ensure co-ordination among various agencies at the national, regional and local levels in order to expedite action and plans formulated in the light of integrated development policies;

(*g*) provide essential training facilities with a view to improving planning skills, promoting comprehensive and innovative population policies and improving management skills in order to increase the administrative capabilities of population and family planning programmes.

5. The Economic Commission for Asia and the Far East (ECAFE) with the co-operation of the United Nations Fund for Population Activities (UNFPA) and other United Nations bodies, should ensure that there are, within the region, facilities for training and research in the fields of population and development, to meet the countries' needs for people skilled in the various areas of policy formulation, planning, implementation and evaluation, and to promote the advancement of knowledge in these fields.

6. The problems encountered in dealing with rapid population growth are of vital concern to the entire world community, and the Second Asian Population Conference requests that the report of its deliberations be taken into consideration in the drafting of the World Population Plan of Action; it likewise calls upon the World Population Conference, in 1974, to consider the means which might be applied on a global level for the solution of these problems.

7. Leadership and assistance on the part of the United Nations and its associated agencies are of crucial importance to all countries in achieving population goals consistent with and fundamental to the purposes set forth in this Declaration.

* "Report of the Second Asian Population Conference", Tokyo, 13 December 1972 (E/CN.11/1065).

WORLD POPULATION PLAN OF ACTION

The World Population Conference,

Having due regard for human aspirations for a better quality of life and for rapid socio-economic development,

Taking into consideration the interrelationship between population situations and socio-economic development,

Decides on the following World Population Plan of Action as a policy instrument within the broader context of the internationally adopted strategies for national and international progress:

A. BACKGROUND TO THE PLAN

1. The promotion of development and improvement of quality of life require co-ordination of action in all major socio-economic fields including that of population, which is the inexhaustible source of creativity and a determining factor of progress. At the international level a number of strategies and programmes whose explicit aim is to affect variables in fields other than population have already been formulated. These include the Provisional Indicative World Plan for Agricultural [illegible]

[illegible]

Organisation's World Employment Programme, the Action Plan for the Human Environment, the United Nations World Plan of Action for the Application of Science and Technology to Development, the Programme of Concerted Action for the Advancement of Women, and, more comprehensively, the International Development Strategy for the Second United Nations Development Decade. The Declaration on the Establishment of a New International Economic Order and the Programme of Action to achieve it, adopted by the United Nations General Assembly at its sixth special session (resolutions 3201 and 3202 (S-VI) of 1 May 1974), provide the most recent over-all framework for international co-operation. The explicit aim of the World Population Plan of Action is to help co-ordinate population trends and the trends of economic and social development. The basis for an effective solution of population problems is, above all, socio-economic transformation. A population policy may have a certain success if it constitutes an integral part of socio-economic development, its contribution to the solution of world development problems is hence only partial, as is the case with the other sectoral strategies. Consequently, the Plan of Action must be considered as an important component of the system of international strategies and as an instrument of the international community for the promotion of economic development, quality of life, human rights and fundamental freedoms.

2. The formulation of international strategies is a response to universal recognition of the existence of important problems in the world and the need for concerted national and international action to achieve their solution. Where trends of population growth, distribution and structure are out of balance with social, economic and environmental factors, they can, at certain stages of development, create additional difficulties for the achievement of sustained development. Policies whose aim is to affect population trends must not be considered substitutes for socio-economic development policies but as being integrated with those policies in order to facilitate the solution of certain problems facing both developing and developed countries and to promote a more balanced and rational development.

3. Throughout history the rate of growth of world population averaged only slightly above replacement levels. The recent increase in the growth rate began mainly as a result of the decline in mortality during the past few centuries, a decline that has accelerated significantly during recent decades. The inertia of social structures and the insufficiency of economic progress, especially when these exist in the absence of profound socio-cultural changes, partly explain why in the majority of developing countries the decline in mortality has not been accompanied by a parallel decline in fertility. Since about 1950, the world population growth rate has risen to 2 per cent a year. If sustained, this will result in a doubling of the world's population every 35 years. However, national rates of natural growth range widely, from a negative rate to well over 3 per cent a year.

4. The consideration of population problems cannot be reduced to the analysis of population trends only. It must also be borne in mind that the present situation of the developing countries originates in the unequal processes of socio-economic development which have divided peoples since the beginning of the modern era. This inequity still exists and is intensified by lack of equity in international economic relations with consequent disparity in levels of living.

5. Although acceleration in the rate of growth of the world's population is mainly the result of very large declines in the mortality of developing countries, those declines have been unevenly distributed. Thus, at present, average expectation of life at birth is 63 years in Latin America, 57 years in Asia and only a little over 46 years in Africa, compared with more than 71 years in the developed regions. Furthermore, although on average less than one in 40 children dies before reaching the age of 1 year in the devel[illegible] regio[illegible]

one in 15 dies before reaching that age in Latin America, one in 10 in Asia and one in 7 in Africa. In fact, in some developing regions, and particularly in African countries, average expectation of life at birth is estimated to be less than 40 years and one in 4 children dies before the age of 1 year. Consequently, many developing countries consider reduction of mortality, and particularly reduction of infant mortality, to be one of the most important and urgent goals.

6. While the right of couples to have the number of children they desire is accepted in a number of international instruments, many couples in the world are unable to exercise that right effectively. In many parts of the world, poor economic conditions, social norms, inadequate knowledge of effective methods of family regulation and the unavailability of contraceptive services result in a situation in which couples have more children than they desire or feel they can properly care for. In certain countries, on the other hand, because of economic or biological factors, problems of involuntary sterility and of subfecundity exist, with the result that many couples have fewer children than they desire. Of course, the degree of urgency attached to dealing with each of these two situations depends upon the prevailing conditions within the country in question.

7. Individual reproductive behaviour and the needs and aspirations of society should be reconciled. In many developing countries, and particularly in the large countries of Asia, the desire of couples to achieve large families is believed to result in excessive national population growth rates and Governments are explicitly attempting to reduce those rates by implementing specific policy measures. On the other hand, some countries are attempting to increase desired family size, if only slightly.

8. Throughout the world, urban populations are growing in size at a considerably faster rate than rural populations. As a result, by the end of this century, and for the first time in history, the majority of the world's population will be living in urban areas. Urbanization is an element of the process of modernization. Moreover, while in certain countries this process is efficiently managed and maximum use is made of the advantages this management presents, in others urbanization takes place in an uncontrolled manner and is accompanied by overcrowding in certain districts, an increase in slums, deterioration of the environment, urban unemployment and many other social and economic problems.

9. In most of the developing countries, although the rate of urban population growth is higher than the growth rate in rural areas, the latter is still significant. The rural population of developing countries is growing at an average rate of 1.7 per cent a year, and in some instances at a faster rate than that of the urban population in developed countries. Furthermore, many rural areas of heavy emigration, in both developed and developing countries, are being depleted of their younger populations and are being left with populations whose age distribution is unfavourable to economic development. Thus, in many countries, the revitalization of the countryside is a priority goal.

10. For some countries international migration may be, in certain circumstances, an instrument of population policy. At least two types of international migration are of considerable concern to many countries in the world: the movement of migrant workers with limited skills, and the movement of skilled workers and professionals. Movements of the former often involve large numbers and raise such questions as the fair and proper treatment in countries of immigration, the breaking up of families and other social and economic questions in countries both of emigration and immigration. The migration of skilled workers and professionals results in a "brain drain", often from less developed to more developed countries, which is at present of considerable concern to many countries and to the international community as a whole. The number of instruments on these subjects and the increased involvement of international organizations reflect international awareness of these problems.

11. A population's age structure is greatly affected by its birth rates. For example, declining fertility is the main factor underlying the declining proportion of children in a population. Thus, according to the medium projections of the United Nations, the population of less than 15 years of age in the developing countries is expected to decline from an average of more than 41 per cent of total population in 1970 to an average of about 35 per cent in 2000. However, such a decline in the proportion of children will be accompanied by an increase in their numbers at an average of 1.7 per cent a year. The demand for educational services is expected to increase considerably, in view of both the existing backlog and the continuously increasing population of children which ought to enter and remain in schools; therefore the supply of educational services must be increased. With regard to the population 15 to 29 years of age, an increase in both their proportion and number is expected in the developing countries. Consequently, unless very high rates of economic development are attained, in many of these countries, and particularly where levels of unemployment and underemployment are already high, the additional difficulties will not be overcome at least until the end of this century. Furthermore, in both developed and developing countries, the greatly changing social and economic conditions faced by youth require a better understanding of the problems involved and the formulation and implementation of policies to resolve them.

12. Declining birth rates also result in a gradual aging of the population. Because birth rates have already declined in developed countries, the average proportion of the population aged 65 years and over in these countries makes up 10 per cent of the total population, whereas it makes up only 3 per cent in developing countries. However, aging of the population in developing countries has recently begun, and is expected to

accelerate Thus, although the total population of these countries is projected to increase by an average of 2.3 per cent a year between 1970 and 2000, the population 65 years and over is expected to increase by 3.5 per cent a year. Not only are the numbers and proportions of the aged increasing rapidly but the social and economic conditions which face them are also rapidly changing. There is an urgent need, in those countries where such programmes are lacking, for the development of social security and health programmes for the elderly.

13. Because of the relatively high proportions of children and youth in the populations of developing countries, declines in fertility levels in those countries will not be fully reflected in declines in population growth rates until some decades later. To illustrate this demographic inertia, it may be noted that, for developing countries, even if replacement levels of fertility—approximately two children per completed family—had been achieved in 1970 and maintained thereafter, their total population would still grow from a 1970 total of 2 5 billion to about 4 4 billion before it would stabilize during the second half of the twenty-first century. In these circumstances, the population of the world as a whole would grow from 3.6 billion to 5.8 billion This example of demographic inertia, which will lead to a growing population for many decades to come, demonstrates that whatever population policies may be formulated, socio-economic development must accelerate in order to provide for a significant increase in levels of living Efforts made by developing countries to speed up economic growth must be viewed by the entire international community as a global endeavour to improve the quality of life for all people of the world, supported by a just utilization of the world's wealth, resources and technology in the spirit of the new [illegible]

[illegible]

priate decisions and actions in their plans for economic and social development well in advance.

B. Principles and objectives of the Plan

14. This Plan of Action is based on a number of principles which underlie its objective and are observed in its formulation. The formulation and implementation of population policies is the sovereign right of each nation. This right is to be exercised in accordance with national objectives and needs and without external interference, taking into account universal solidarity in order to improve the quality of life of the peoples of the world. The main responsibility for national population policies and programmes lies with national authorities. However, international co-operation should play an important role in accordance with the principles of the United Nations Charter. The Plan of Action is based on the following principles·

(*a*) The principal aim of social, economic and cultural development, of which population goals and policies are integral parts, is to improve levels of living and the quality of life of the people. Of all things in the world, people are the most precious. Man's knowledge and ability to master himself and his environment will continue to grow Mankind's future can be made infinitely bright,

(*b*) True development cannot take place in the absence of national independence and liberation Alien and colonial domination, foreign occupation, wars of aggression, racial discrimination, *apartheid* and neo-colonialism in all its forms, continue to be among the greatest obstacles to the full emancipation and progress of the developing countries and all the people involved Co-operation among nations on the basis of national sovereignty is essential for development. Development also requires recognition of the dignity of the individual, appreciation for the human person and his self-determination, as well as the elimination of discrimination in all its forms,

(*c*) Population and development are interrelated. population variables influence development variables and are also influenced by them, thus the formulation of a World Population Plan of Action reflects the international community's awareness of the importance of population trends for socio-economic development, and the socio-economic nature of the recommendations contained in this Plan of Action reflects its awareness of the crucial role that development plays in affecting population trends;

(*d*) Population policies are constituent elements of [illegible]

[illegible]

recognized human rights of individual freedom, justice and the survival of national, regional and minority groups;

(*e*) Independently of the realization of economic and social objectives, respect for human life is basic to all human societies;

(*f*) All couples and individuals have the [illegible]

[illegible]

individuals in the exercise of this right takes into account the needs of their living and future children, and their responsibilities towards the community;

(*g*) The family is the basic unit of society and should be protected by appropriate legislation and policy,

(*h*) Women have the right to complete integration in the development process particularly by means of an equal access to education and equal participation in social, economic, cultural and political life. In addition, the necessary measures should be taken to facilitate this integration with family responsibilities which should be fully shared by both partners;

(*i*) Recommendations in this Plan of Action regarding policies to deal with population problems must

recognize the diversity of conditions within and among different countries;

(*j*) In the democratic formulation of national population goals and policies, consideration must be given, together with other economic and social factors, to the supplies and characteristics of natural resources and to the quality of the environment and particularly to all aspects of food supply including productivity of rural areas. The demand for vital resources increases not only with growing population but also with growing *per capita* consumption; attention must be directed to the just distribution of resources and to the minimization of wasteful aspects of their use throughout the world;

(*k*) The growing interdependence among nations makes international action increasingly important to the solution of development and population problems. International strategies will achieve their objective only if they ensure that the underprivileged of the world achieve, urgently, through structural, social and economic reforms, a significant improvement in their living conditions;

(*l*) This Plan of Action must be sufficiently flexible to take into account the consequences of rapid demographic changes, societal changes and changes in human behaviour, attitudes and values;

(*m*) The objectives of this Plan of Action should be consistent with the purposes and principles of the United Nations Charter, the Universal Declaration of Human Rights and with the objectives of the Second United Nations Development Decade; however, changes in demographic variables during the Decade are largely the result of past demographic events and changes in demographic trends sought during the Decade have social and economic repercussions up to and beyond the end of this century.

15. Guided by these principles, the primary aim of this Plan of Action is to expand and deepen the capacities of countries to deal effectively with their national and subnational population problems and to promote an appropriate international response to their needs by increasing international activity in research, the exchange of information, and the provision of assistance on request. In pursuit of this primary aim, the following general objectives are set for this Plan of Action:

(*a*) To advance understanding of population at global, regional, national and subnational levels, recognizing the diversity of the problems involved;

(*b*) To advance national and international understanding of the interrelationship of demographic and socio-economic factors in development: on the one hand, of the nature and scope of the effect of demographic factors on the attainment of goals of advancing human welfare, and, on the other hand, the impact of broader social, economic and cultural factors on demographic behaviour;

(*c*) To promote socio-economic measures and programmes whose aim is to affect, *inter alia*, population growth, morbidity and mortality, reproduction a family formation, population distribution and inter migration, international migration and, consequen demographic structures;

(*d*) To advance national and international und standing of the complex relations among the proble of population, resources, environment and developme and to promote a unified analytical approach to study of these interrelationships and to relevant polici

(*e*) To promote the status of women and expansion of their roles, their full participation in formulation and implementation of socio-econon policy, including population policies, and the creation awareness among all women of their current a potential roles in national life;

(*f*) To recommend guidelines for population polici consistent with national values and goals and wi internationally recognized principles;

(*g*) To promote the development and implement tion of population policies where necessary, including in provement in the communication of the purposes an goals of those policies to the public and the promotion popular participation in their formulation and impl mentation;

(*h*) To encourage the development and goo management of appropriate education, training, stati tical research, information and family health services well as statistical services in support of the abov principles and objectives.

C. Recommendations for action

1. *Population goals and policies*

(a) *Population growth*

16. According to the United Nations mediun population projections, little change is expected to occu in average rates of population growth either in th developed or in the developing regions by 1985 According to the United Nations low variant projec tions, it is estimated that, as a result of social an economic development and population policies a reported by countries in the Second United Nation Inquiry on Population and Development, populatio growth rates in the developing countries as a whole ma decline from the present level of 2.4 per cent pe annum to about 2 per cent by 1985 and may remain belov 0.7 per cent per annum in the developed countries. I this case the world-wide rate of population growt would decline from 2 per cent to about 1.7 per cent.

17. Countries which consider that their present o expected rates of population growth hamper their goal of promoting human welfare are invited, if they hav not yet done so, to consider adopting populatio policies, within the framework of socio-economic development, which are consistent with basic human rights and national goals and values.

18. Countries which aim at achieving moderate or low population growth should try to achieve it through a

low level of birth and death rates. Countries wishing to increase their rate of population growth should, when mortality is high, concentrate efforts on the reduction of mortality, and where appropriate, encourage an increase in fertility and encourage immigration

19. Recognizing that *per capita* use of world resources is much higher in the developed than in the developing countries, the developed countries are urged to adopt appropriate policies in population, consumption and investment, bearing in mind the need for fundamental improvement in international equity

(b) *Morbidity and mortality*

20. The reduction of morbidity and mortality to the maximum feasible extent is a major goal of every human society. It should be achieved in conjunction with massive social and economic development Where mortality and morbidity rates are very high, concentrated national and international efforts should be applied to reduce them as a matter of highest priority in the context of societal change.

21. The short-term effect of mortality reduction on population growth rates is symptomatic of the early development process and must be viewed as beneficial. Sustained reductions in fertility have generally been preceded by reductions in mortality Although this relationship is complex, mortality reduction may be a prerequisite to a decline in fertility.

22. It is a goal of this Plan of Action to reduce mortality levels, particularly infant and maternal mortality levels, to the maximum extent possible in all regions of the world and to reduce national and subnational differentials therein. The attainment of an average expectation of life of 62 years by 1985 and 74 years by the year 2000 for the world as a whole would require by the end of the century an increase of 11 years for Latin America, 17 years for Asia and 28 years for Africa.

23. Countries with the highest mortality levels should aim by 1985 to have an expectation of life at birth of at least 50 years and an infant mortality rate of less than 120 per thousand live births.

24. It is recommended that national and international efforts to reduce general morbidity and mortality levels be accompanied by particularly vigorous efforts to achieve the following goals·

(*a*) Reduction of foetal, infant and early childhood mortality and related maternal morbidity and mortality,

(*b*) Reduction of involuntary sterility, subfecundity, defective births and illegal abortions;

(*c*) Reduction or, if possible, elimination of differential morbidity and mortality within countries, particularly with regard to differentials between regions, urban and rural areas, social and ethnic groups, and the sexes;

(*d*) Eradication, wherever possible, or control of infectious and parasitic diseases, undernutrition and malnutrition; and the provision of a sufficient supply of potable water and adequate sanitation;

(*e*) Improvement of poor health and nutritional con ditions which adversely affect working-age population and their productivity and thus undermine developmen efforts,

(*f*) Adoption of special measures for reducin mortality from social and environmental factors an elimination of aggression as a cause of death and poo health

25 It is recommended that health and nutritio programmes designed to reduce morbidity and mortalit be integrated within a comprehensive developmen strategy and supplemented by a wide range of mutuall supporting social policy measures; special attentio should be given to improving the management o existing health, nutrition and related social services an to the formulation of policies to widen their coverag so as to reach, in particular, rural, remote and under privileged groups

26 Each country has its own experience in pre venting and treating diseases Promotion of interchang of such experience will help to reduce morbidity an mortality.

(c) *Reproduction, family formation and the status o women*

27. This Plan of Action recognizes the variety o national goals with regard to fertility and does no recommend any world family-size norm

28. This Plan of Action recognizes the necessity o

preparing the social and economic conditions to achiev that desire.

29 Consistent with the Proclamation of the Inter national Conference on Human Rights, the Declaratio on Social Progress and Development, the relevan targets of the Second United Nations Developmen Decade and the other international instruments on th subject, it is recommended that all countries

(*a*) Respect and ensure, regardless of their over-al demographic goals, the right of persons to determine in a free, informed and responsible manner, the numbe and spacing of their children,

(*b*) Encourage appropriate education concernin responsible parenthood and make available to person who so desire advice and the means of achieving it;

(*c*) Ensure that family planning, medical and relate social services aim not only at the prevention o unwanted pregnancies but also at the elimination o involuntary sterility and subfecundity in order that al couples may be permitted to achieve their desire number of children, and that child adoption may b facilitated,

(*d*) Seek to ensure the continued possibility o variations in family size when a low fertility level ha been established or is a policy objective;

(*e*) Make use, wherever needed and appropriate, o adequately trained professional a auxili lth

personnel, rural extension, home economics and social workers, and non-governmental channels, to help provide family planning services and to advise users of contraceptives;

(*f*) Increase their health manpower and health facilities to an effective level, redistribute functions among the different levels of professionals and auxiliaries in order to overcome the shortage of qualified personnel and establish an effective system of supervision in their health and family planning services;

(*g*) Ensure that information about, and education in, family planning and other matters which affect fertility are based on valid and proven scientific knowledge, and include a full account of any risk that may be involved in the use or non-use of contraceptives.

30. Governments which have family planning programmes are invited to consider integrating and co-ordinating those services with health and other services designed to raise the quality of family life, including family allowances and maternity benefits, and to consider including family planning services in their official health and social insurance systems. As concerns couples themselves, family planning policy should also be directed towards the promotion of the phycho-social harmony and mental and physical well-being of couples.

31. It is recommended that countries wishing to affect fertility levels give priority to implementing development programmes and educational and health strategies which, while contributing to economic growth and higher standards of living, have a decisive impact upon demographic trends, including fertility. International co-operation is called for to give priority to assisting such national efforts in order that these programmes and strategies be carried into effect.

32. While recognizing the diversity of social, cultural, political and economic conditions among countries and regions, it is nevertheless agreed that the following development goals generally have an effect on the socio-economic context of reproductive decisions that tends to moderate fertility levels:

(*a*) The reduction of infant and child mortality, particularly by means of improved nutrition, sanitation, maternal and child health care, and maternal education;

(*b*) The full integration of women into the development process, particularly by means of their greater participation in educational, social, economic and political opportunities, and especially by means of the removal of obstacles to their employment in the non-agricultural sector wherever possible. In this context, national laws and policies, as well as relevant international recommendations, should be reviewed in order to eliminate discrimination in, and remove obstacles to, the education, training, employment and career advancement opportunities for women;

(*c*) The promotion of social justice, social mobility and social development, particularly by means of a wide participation of the population in development and a more equitable distribution of income, land, social services and amenities;

(*d*) The promotion of wide educational opportunities for the young of both sexes, and the extension of public forms of pre-school education for the rising generation;

(*e*) The elimination of child labour and child abuse and the establishment of social security and old-age benefits;

(*f*) The establishment of an appropriate lower limit for age at marriage.

33. It is recommended that Governments consider making provision, in both their formal and non-formal educational programmes, for informing their people of the consequences of existing or alternative fertility behaviour for the well-being of the family, for educational and psychological development of children and for the general welfare of society, so that an informed and responsible attitude to marriage and reproduction will be promoted.

34. Family size may also be affected by incentive and disincentive schemes. However, if such schemes are adopted or modified it is essential that they should not violate human rights.

35. Some social welfare programmes, such as family allowances and maternity benefits, may have a positive effect on fertility and may hence be strengthened when such an effect is desired. However, such programmes should not, in principle, be curtailed if the opposite effect on fertility is desired.

36. The projections in paragraph 16 of future declines in rates of population growth, and those in paragraph 22 concerning increased expectation of life, are consistent with declines in the birth rate of the developing countries as a whole from the present level of 38 per thousand to 30 per thousand by 1985; in these projections, birth rates in the developed countries remain in the region of 15 per thousand. To achieve by 1985 these levels of fertility would require substantial national efforts, by those countries concerned, in the field of socio-economic development and population policies, supported, upon request, by adequate international assistance. Such efforts would also be required to achieve the increase in expectation of life.

37. In the light of the principles of this Plan of Action, countries which consider their birth rates detrimental to their national purposes are invited to consider setting quantitative goals and implementing policies that may lead to the attainment of such goals by 1985. Nothing herein should interfere with the sovereignty of any Government to adopt or not to adopt such quantitative goals.

38. Countries which desire to reduce their birth rates are invited to give particular consideration to the reduction of fertility at the extremes of female reproductive ages because of the salutary effects this may have on infant and maternal welfare.

39. The family is recognized as the basic unit of society. Governments should assist families as far as

possible to enable them to fulfil their role in society. It is therefore recommended that:

(a) The family be protected by appropriate legislation and policy without discrimination as to other members of society,

(b) Family ties be strengthened by giving recognition to the importance of love and mutual respect within the family unit,

(c) National legislation having direct bearing on the welfare of the family and its members, including laws concerning age at marriage, inheritance, property rights, divorce, education, employment and the rights of the child, be periodically reviewed, as feasible, and adapted to the changing social and economic conditions and with regard to the cultural setting;

(d) Marriages be entered into only with the free and full consent of the intending spouses,

(e) Measures be taken to protect the social and legal rights of spouses and children in the case of dissolution or termination of marriage by death or other reason

40 It is also recommended that

(a) Governments should equalize the legal and social status of children born in and out of wedlock as well as children adopted;

(b) The legal responsibilities of each parent towards the care and support of all their children should be established

41. Governments should ensure full participation of women in the educational, social, economic and political life of their countries on an equal basis with men It is recommended that:

(a) Education for girls as well as boys should be extended and diversified to enable them to contribute more effectively in rural and urban sectors, as well as in the management of food and other household functions,

(b) Women should be actively involved both as individuals and through political and non-governmental organizations, at every stage and every level in the planning and implementation of development programmes, including population policies,

(c) The economic contribution of women in households and farming should be recognized in national economies,

(d) Governments should make a sustained effort to ensure that legislation regarding the status of women complies with the principles spelled out in the Declaration on the Elimination of Discrimination against Women and other United Nations declarations, conventions and international instruments, to reduce the gap between law and practice through effective implementation, and to inform women at all socio-economic levels of their legal rights and responsibilities

42. Equal status of men and women in the family and in society improves the over-all quality of life. This principle of equality should be fully realized in family planning where each spouse should consider the welfare of the other members of the family.

43 Improvement of the status of women in the family and in society can contribute, where desired, to smaller family size, and the opportunity for women to plan births also improves their individual status.

(d) *Population distribution and internal migration*

44 Urbanization in most countries is characterized by a number of adverse factors: drain from rural areas through migration of individuals who cannot be absorbed by productive employment in urban areas, serious disequilibrium in the growth of urban centres, contamination of the environment, inadequate housing and services and social and psychological stress In many developing countries, adverse consequences are due in large part to the economic structures resulting from the dependent situation of those countries in the international economic system, the correction of these shortcomings requires as a matter of priority the establishment of equitable economic relations among peoples

45 Policies aimed at influencing population flows into urban areas should be co-ordinated with policies relating to the absorptive capacity of urban centres as well as policies aimed at eliminating the undesirable consequences of excessive migration In so far as possible, those policies should be integrated into plans and programmes dealing with over-all social and economic development

46 In formulating and implementing internal migration policies, Governments are urged to consider the following guidelines, without prejudice to their own socio-economic policies

(a) Measures should be avoided which infringe the right of freedom of movement and residence within the borders of each State as enunciated in the Universal Declaration of Human Rights and other international instruments;

(b) A major approach to a more rational distribution of the population is that of planned and more equitable regional development, particularly in the advancement of regions which are less favoured or developed by comparison with the rest of the country,

(c) In planning development, and particularly in planning the location of industry and business and the distribution of social services and amenities, Governments should take into account not only short-term economic returns or alternative patterns but also the social and environmental costs and benefits involved as well as equity and social justice in the distribution of the benefits of development among all groups and regions,

(d) Population distribution patterns should not be restricted to a choice between metropolitan and rural life: efforts should be made to establish and strengthen networks of small and medium-size cities to relieve the pressure on the large towns, while still offering an alternative to rural living,

(e) Intensive programmes of economic and social improvement should be carried out in the rural areas

through balanced agricultural development which will provide increased income to the agricultural population, permit an effective expansion of social services and include measures to protect the environment and conserve and increase agricultural resources;

(*f*) Programmes should be promoted to make accessible to scattered populations the basic social services and the support necessary for increased productivity, for example by consolidating them in rural centres.

47. Internal migration policies should include the provision of information to the rural population concerning economic and social conditions in the urban areas, including information on the availability of employment opportunities.

48. In rural areas and areas accessible to rural populations, new employment opportunities, including industries and public works programmes, should be created, systems of land tenure should be improved and social services and amenities provided. It is not sufficient to consider how to bring the people to existing economic and social activities; it is also important to bring those activities to the people.

49. Considerable experience is now being gained by some countries which have implemented programmes for relieving urban pressures, revitalizing the countryside, inhabiting sparsely populated areas and settling newly reclaimed agricultural land. Countries having such experience are invited to share it with other countries. It is recommended that international organizations make available upon request co-ordinated technical and financial assistance to facilitate the settlement of people.

50. The problems of urban environment are a consequence not only of the concentration of inhabitants but also of their way of life, which can produce harmful effects, such as wasteful and excessive consumption and activities which produce pollution. In order to avoid such effects in those countries experiencing this problem, a development pattern favouring balanced and rational consumption is recommended.

(e) *International migration*

51. It is recommended that Governments and international organizations generally facilitate voluntary international movement. However, such movements should not be based on racial considerations which are to the detriment of indigenous populations. The significance of international migration varies widely among countries, depending upon their area, population size and growth rate, social and economic structure and environmental conditions.

52. Governments which consider international migration to be important to their countries, either in the short or the long run, are urged to conduct, when appropriate, bilateral or multilateral consultations, taking into account the principles of the Charter of the United Nations, the Universal Declaration of Human Rights, the relevant resolutions of the United Nations system and other international instruments, with a view to harmonizing those of their policies which affect these movements. It is recommended that international organizations make available upon request co-ordinated technical and financial assistance to facilitate the settlement of people in countries of immigration.

53. Problems of refugees and displaced persons arising from forced migration, including their right of return to homes and properties, should also be settled in accordance with the relevant Principles of the Charter of the United Nations, the Universal Declaration of Human Rights and other international instruments.

54. Countries that are concerned with the outflow of migrant workers and wish to encourage and assist those remaining workers or returning workers should make particular efforts to create favourable employment opportunities at the national level. More developed countries should co-operate, bilaterally or through regional organizations and the international community, with less developed countries, to achieve these goals through the increased availability of capital, technical assistance, export markets and more favourable terms of trade and choice of production technology.

55. Countries receiving migrant workers should provide proper treatment and adequate social welfare services for them and their families, and should ensure their physical safety and security, in conformity with the provisions of the relevant conventions and recommendations of the International Labour Organisation and other international instruments.

56. Specifically, in the treatment of migrant workers, Governments should work to prevent discrimination in the labour market and in society through lower salaries or other unequal conditions, to preserve their human rights, to combat prejudice against them and to eliminate obstacles to the reunion of their families. Governments should enable permanent immigrants to preserve their cultural heritage *inter alia* through the use of their mother tongue. Laws to limit illegal immigration should relate not only to the illegal migrants themselves but also to those inducing or facilitating their illegal action and should be promulgated in conformity with international law and basic human rights. Governments should bear in mind humanitarian considerations in the treatment of aliens who remain in a country illegally.

57. Since the outflow of qualified personnel from developing to developed countries seriously hampers the development of the former, there is an urgent need to formulate national and international policies to avoid the "brain drain" and to obviate its adverse effects, including the possibility of devising programmes for large-scale communication of appropriate technological knowledge mainly from developed countries to the extent that it can be properly adjusted and appropriately absorbed.

58. Developing countries suffering from heavy emigration of skilled workers and professionals should undertake extensive educational programmes, manpower planning, and investment in scientific and technical programmes. They should also undertake other pro-

grammes and measures to better match skills with employment opportunities and to increase the motivation of such personnel to contribute to the progress of their own country. Measures should be taken to encourage the return of scientists and skilled personnel to specific job vacancies

59 Foreign investors should employ and train local personnel and use local research facilities to the greatest possible extent in conformity with the policies of the host country. Subject to their consent, the location of research facilities in host countries may aid them to a *certain extent in retaining the services of highly skilled* and professional research workers Such investment should, of course, in no circumstances inhibit national economic development International co-operation is needed to improve programmes to induce skilled personnel to return to, or remain in, their own countries

60 Where immigration has proved to be of a long-term nature, countries are invited to explore the possibilities of extending national civil rights to immigrants

61. The flow of skilled workers, technicians and professionals from more developed to less developed countries may be considered a form of international co-operation Countries in a position to do so should continue and increase this flow with full respect for the sovereignty and equality of recipient countries.

62. Countries affected by significant numbers of migrant workers are urged, if they have not yet done so, to conclude bilateral or multilateral agreements which would regulate migration, protect and assist migrant workers, and protect the interests of the countries concerned The International Labour Organisation should promote concerted action in the field of protection of migrant workers, and the United Nations Commission on Human Rights should help, as appropriate, to ensure that the fundamental rights of migrants are safeguarded.

(f) *Population structure*

63. All Governments are urged, when formulating *their development policies and programmes, to take* fully into account the implications of changing numbers and proportions of youth, working-age groups and the aged, particularly where such changes are rapid Countries should study their population structures to determine the most desirable balance among age groups.

64. Specifically, developing countries are urged to consider the implications which the combination of the characteristically young age structure and moderate to high fertility has on their development The increasing number and proportion of young persons in the populations of developing countries requires appropriate development strategies, priority being accorded to their subsistence, health, education, training and incorporation in the labour force through full employment as well as their active participation in political, cultural, social and economic life.

65. Developing countries are invited to consider the possible economic, social and demographic effects of population shifts from agriculture to non-agricultural industries In addition to fuller utilization of labour and improvements in productivity and the levels of living, promotion of non-agricultural employment should aim at such changes in the socio-economic structure of manpower and population as would affect demographically relevant behaviour of individuals All countries are invited to consider fully giving appropriate support and assistance to the World Employment Programme and related national employment promotion schemes

66 *Similarly, the other countries are urged to* consider the contrary implications of the combination of their aging structure with moderate to low or very low fertility All countries should carry out, as part of their development programmes, comprehensive, humanitarian and just programmes of social security for the elderly

67. In undertaking settlement and resettlement schemes and urban planning, Governments are urged to give adequate attention to questions of age and sex balance and, particularly, to the welfare of the family.

2 *Socio-economic policies*

68 This Plan of Action recognizes that economic and social development is a central factor in the solution of population problems. National efforts of developing countries to accelerate economic growth should be assisted by the entire international community The implementation of the International Development Strategy for the Second United Nations Development Decade, and the Declaration and the Programme of Action on the New International Economic Order as adopted at the sixth special session of the General Assembly should lead to a reduction in the widening gap in levels of living between developed and developing countries and would be conducive to a reduction in population growth rates particularly in countries where such rates are high

69. In planning measures to harmonize population trends and socio-economic change, human beings must be *regarded not only as consumers but also as producers* The investment by nations in the health and education of their citizens contributes substantially to productivity Consequently, plans for economic and social development and for international assistance for this purpose should emphasize the health and education sectors Likewise, patterns of production and technology should be adapted to each country's endowment in human resources. Decisions on the introduction of technologies affording significant savings in employment of manpower should take into account the relative abundance of human resources. To this end it is recommended that efforts should be intensified to determine for each country the technologies and production methods best suited to its working population situation and to study the relationship between population factors and employment.

70 It is imperative that all countries, and within them all social sectors, should adapt [illegible] more

rational utilization of natural resources, without excess, so that some are not deprived of what others waste. In order to increase the production and distribution of food for the growing world population it is recommended that Governments give high priority to improving methods of food production, the investigation and development of new sources of food and more effective utilization of existing sources. International co-operation is recommended with the aim of ensuring the provision of fertilizers and energy and a timely supply of food-stuffs to all countries.

3. *Promotion of knowledge and policies*

71. In order to achieve the population objectives of this Plan of Action and to put its policy recommendations adequately into effect, measures need to be undertaken to promote knowledge of the relationships and problems involved, to assist in the development of population policies and to elicit the co-operation and participation of all concerned in the formulation and implementation of these policies.

(a) *Data collection and analysis*

72. Statistical data on the population collected by means of censuses, surveys or vital statistics registers are essential for the planning of investigations and the provision of a basis for the formulation, evaluation and application of population and development policies. Countries that have not yet done so are urged to tabulate and analyse their census and other data and make them available to national policy-making bodies in order to fulfil these objectives.

73. It is up to each country to take a population census in accordance with its own needs and capabilities. However, it is recommended that a population census be taken by each country between 1975 and 1985. It is also recommended that those censuses give particular attention to data relevant to development planning and the formulation of population policies. In order to be of greatest value, it is recommended that the data be tabulated and made available as quickly as possible, together with an evaluation of the quality of the information and the degree of coverage of the census.

74. All countries that have not yet done so are encouraged to establish a continuing capability for taking household sample surveys and to establish a long-term plan for regular collection of statistics on various demographic and interrelated socio-economic variables, particularly those relating to the improvement of levels of living, well-being and level of education of individuals, factors which relate closely to problems affecting population. All countries are invited to co-operate with the World Fertility Survey.

75. In line with the objectives of the World Programme for the Improvement of Vital Statistics, countries are encouraged to establish or improve their vital registration system, as a long-term objective, and to enact laws relevant to the improvement of vital registration. Until this improvement is completed, the use alternative methods is recommended, such as sam surveys, to provide up-to-date information on v events.

76. Developing countries should be provided w technical co-operation, equipment and financial supp to develop or improve the population and rela statistical programmes mentioned above. Provision data-gathering assistance should cover fully the n for evaluating, analysing and presenting the data i form most appropriate to the needs of users.

77. Governments that have not yet done so urged to establish appropriate services for the collecti analysis and dissemination of demographic and rela statistical information.

(b) *Research*

78. This Plan of Action gives high priority research activities in population problems (includ unemployment, starvation and poverty) and to rela fields, particularly to research activities that are imp tant for the formulation, evaluation and implementati of the population policies consistent with full resp for human rights and fundamental freedoms as rec nized in international instruments of the United Natio Although research designed to fill gaps in knowledge very urgent and important, high priority should be giv to research oriented to the specific problems of cou tries and regions, including methodological studies. Su research is best carried out in the countries and regio themselves and by competent persons especia acquainted with national and regional conditions. T following areas are considered to require research order to fill existing gaps in knowledge:

(*a*) The social, cultural and economic determinan of population variables in different developmental a political situations, particularly at the family and mic levels;

(*b*) The demographic and social processes occurri within the family cycle through time and, particularl in relation to alternative modes of development;

(*c*) The development of effective means for t improvement of health, and especially for the reducti of maternal, foetal, infant and early childhood mortalit

(*d*) The study of experiences of countries which ha major programmes of internal migration with a view developing guidelines that are helpful to policy-make of those countries and of countries that are interested undertaking similar programmes;

(*e*) Projections of demographic and related variabl including the development of empirical and hypothetic models for simulating possible future trends;

(*f*) The formulation, implementation and evaluatio of population policies including: methods for integratin population inputs and goals in development plans an programmes; means for understanding and improvin the motivations of people to participate in the formula tion and implementation of population programme

study of education and communication aspects of population policy; analysis of population policies in their relationship to other socio-economic development policies, laws and institutions, including the possible influences of the economic system on the social, cultural and economic aspects of population policies; translation into action programmes of policies dealing with the socio-economic determinants of fertility, mortality, internal migration and distribution and international migration;

(*g*) The collection, analysis and dissemination of information concerning human rights in relation to population matters and the preparation of studies designed to clarify, systematize and more effectively implement those human rights;

(*h*) The review and analysis of national and international laws which bear directly or indirectly on population factors;

(*i*) The assessment and improvement of existing and new methods of fertility regulation by means of research, including basic biological and applied research, the evaluation of the impact, both in short-term and long-term effects, of different methods of fertility regulation on ethical and cultural values and on mental and physical health; and the assessment and study of policies for creating social and economic conditions so that couples can freely decide on the size of their families,

(*j*) The evaluation of the impact of different methods of family planning on the health conditions of women and members of their families;

(*k*) The interrelationships among patterns of family formation, nutrition and health, reproductive biology, and the incidence, causes and treatment of sterility;

(*l*) Methods of improving the management, delivery and utilization of all social services associated with population, including family welfare and, when appropriate, family planning;

(*m*) Methods for the development of systems of social, demographic and related economic statistics in which various sets of data are interlinked, with a view to improving insight into the interrelationships of variables in these fields,

(*n*) The interrelations of population trends and conditions and other social and economic variables, in particular the availability of human resources, food and natural resources, the quality of the environment, the need for health, education, employment, welfare, housing and other social services and amenities, promotion of human rights, the enhancement of the status of women, the need for social security, political stability, discrimination and political freedom,

(*o*) The impact of a shift from one family size pattern to another on biological and demographic characteristics of the population,

(*p*) The changing structure, functions and dynamics of the family as an institution, including the changing roles of men and women, attitudes towards and opportunities for women's education and employment; the implications of current and future population trends for the status of women; biomedical research on male and female fertility, and the economic, social and demographic benefits to be derived from the integration of women in the development process;

(*q*) Development of social indicators, reflecting the quality of life as well as the interrelations between socio-economic and demographic phenomena, should be encouraged Emphasis should also be given to the development of socio-economic and demographic models.

79. National research requirements and needs must be determined by Governments and national institutions However, high priority should be given, wherever possible, to research that has wide relevance and international applicability.

80 National and regional research institutions dealing with population and related questions should be assisted and expanded as appropriate. Special efforts should be made to co-ordinate the research of those institutions by facilitating the exchange of their research findings and the exchange of information on their planned and ongoing research projects.

(c) *Management, training, education and information*

81 There is a particular need for the development of management in all fields related to population, with national and international attention and appropriate support given to programmes dealing with its promotion

82 A dual approach to training is recommended: an international programme for training in population matters concomitant with national and regional training programmes adapted and made particularly relevant to conditions in the countries and regions of the trainees While recognizing the complementarity of these two approaches, national and regional training should be given the higher priority

83 Training in population dynamics and policies, whether national, regional or international, should, in so far as possible, be interdisciplinary in nature The training of population specialists should always be accompanied by relevant career development for the trainees in their fields of specialization Training should deal not only with population variables but also with interrelationships of these variables with economic, social and political variables

84. Training in the various aspects of population activities, including the management of population programmes should not be restricted to the higher levels of specialization but should also be extended to personnel at other levels, and, where needed, to medical, paramedical and traditional health personnel, and population programme administrators. Such training should impart an adequate knowledge of human rights in accordance with international standards and an awareness of the human rights aspect of population problems.

85 Training in population matters should be extended to labour, community and other leaders, and to senior government

enabling them better to identify the population problems of their countries and communities and to help in the formulation of policies relating to them.

86. Owing to the role of education in the progress of individuals and society and the impact of education on demographic behaviour, all countries are urged to further develop their formal and informal educational programmes; efforts should be made to eradicate illiteracy, to promote education among the youth and abolish factors discriminating against women.

87. Educational institutions in all countries should be encouraged to expand their curricula to include a study of population dynamics and policies, including, where appropriate, family life, responsible parenthood and the relation of population dynamics to socio-economic development and to international relations. Governments are urged to co-operate in developing a world-wide system of international, regional and national institutions to meet the need for trained manpower. Assistance to the less developed countries should include, as appropriate, the improvement of the educational infrastructure such as library facilities and computer services.

88. Governments are invited to use all available means for disseminating population information.

89. Governments are invited to consider the distribution of population information to enlighten both rural and urban populations, through the assistance of governmental agencies.

90. Voluntary organizations should be encouraged, within the framework of national laws, policies and regulations, to play an important role in disseminating population information and ensuring wider participation in population programmes, and to share experiences regarding the implementation of population measures and programmes.

91. International organizations, both governmental and non-governmental, should strengthen their efforts to distribute information on population and related matters, particularly through periodic publications on the world population situation, prospects and policies, the utilization of audio-visual and other aids to communication, the publication of non-technical digests and reports, and the production and wide distribution of newsletters on population activities. Consideration should also be given to strengthening the publication of international professional journals and reviews in the field of population.

92. In order to achieve the widest possible dissemination of research results, translation activities should be encouraged at both the national and international levels. In this respect, the revision of the *Multilingual Demographic Dictionary* [1] and its publication in additional languages are strongly recommended.

93. The information and experience resulting from the World Population Conference and the World Population Year relating to the scientific study of population and the elaboration of population policies should be synthesized and disseminated by the United Nations.

(d) *Development and evaluation of population policies*

94. Where population policies or programmes have been adopted, systematic and periodic evaluations of their effectiveness should be made with a view to their improvement.

95. Population measures and programmes should be integrated into comprehensive social and economic plans and programmes and this integration should be reflected in the goals, instrumentalities and organizations for planning within the countries. In general, it is suggested that a unit dealing with population aspects be created and placed at a high level of the national administrative structure and that such a unit be staffed with qualified persons from the relevant disciplines.

D. Recommendations for implementation

1. *Role of national Governments*

96. The success of this Plan of Action will largely depend on the actions undertaken by national Governments. To take action, Governments are urged to utilize fully the support of intergovernmental and non-governmental organizations.

97. This Plan of Action recognizes the responsibility of each Government to decide on its own policies and devise its own programmes of action for dealing with the problems of population and economic and social progress. Recommendations, in so far as they relate to national Governments, are made with due regard to the need for variety and flexibility in the hope that they may be responsive to major needs in the population field as perceived and interpreted by national Governments. However, national policies should be formulated and implemented without violating, and with due promotion of, universally accepted standards of human rights.

98. An important role of Governments with regard to this Plan of Action is to determine and assess the population problems and needs of their countries in the light of their political, social, cultural, religious and economic conditions; such an undertaking should be carried out systematically and periodically so as to promote informed, rational and dynamic decision-making in matters of population and development.

99. The effect of national action or inaction in the fields of population may, in certain circumstances, extend beyond national boundaries; such international implications are particularly evident with regard to aspects of morbidity, population concentration and international migration, but may also apply to other aspects of population concern.

2. *Role of international co-operation*

100. International co-operation, based on the peaceful coexistence of States having different social systems,

[1] United Nations publication, Sales No. 58.XIII.4.

should play a supportive role in achieving the goals of the Plan of Action. This supportive role could take the form of direct assistance, technical or financial, in response to national and regional requests and be additional to economic development assistance, or the form of other activities, such as monitoring progress, undertaking comparative research in the area of population, resources and consumption, and furthering the exchange among countries of information and policy experiences in the field of population and consumption. Assistance should be provided on the basis of respect for sovereignty of the recipient country and its national policy.

101 The General Assembly of the United Nations, the Economic and Social Council, the Governing Council of the United Nations Development Programme/United Nations Fund for Population Activities and other competent legislative and policy-making bodies of the specialized agencies and the various intergovernmental organizations are urged to give careful consideration to this Plan of Action and to ensure an appropriate response to it.

102. Countries sharing similar population conditions and problems are invited to consider jointly this Plan of Action, exchange experience in relevant fields and elaborate those aspects of the Plan that are of particular relevance to them. The United Nations regional economic commissions and other regional bodies of the United Nations system should play an important role towards this end

103 There is a special need for training in the field of population The United Nations system, Governments and, as appropriate, non-governmental organizations are urged to give recognition to that need and priority to the measures necessary to meet it, including information, education and services for family planning

104. Developed countries, and other countries able to assist, are urged to increase their assistance to developing countries in accordance with the goals of the Second United Nations Development Decade and, together with international organizations, make that assistance available in accordance with the national priorities of receiving countries In this respect, it is recognized, in view of the magnitude of the problems and the consequent national requirements for funds, that considerable expansion of international assistance in the population field is required for the proper implementation of this Plan of Action.

105. It is suggested that the expanding, but still insufficient, international assistance in population and development matters requires increased co-operation; the United Nations Fund for Population Activities is urged, in co-operation with all organizations responsible for international population assistance, to produce a guide for international assistance in population matters which would be made available to recipient countries and institutions and be revised periodically.

106 International non-governmental organizations are urged to respond to the goals and policies of this Plan of Action by co-ordinating their activities with those of other non-governmental organizations, and with those of relevant bilateral and multilateral organizations, by expanding their support for national institutions and organizations dealing with population questions, and by co-operating in the promotion of widespread knowledge of the goals and policies of the Plan of Action, and, when requested, by supporting national and private institutions and organizations dealing with population questions.

3 *Monitoring, review and appraisal*

107 It is recommended that monitoring of population trends and policies discussed in this Plan of Action should be undertaken continuously as a specialized activity of the United Nations and reviewed biennially by the appropriate bodies of the United Nations system, beginning in 1977 Because of the shortness of the intervals, such monitoring would necessarily have to be selective with regard to its informational content and should focus mainly on new and emerging population trends and policies

108 A comprehensive and thorough review and appraisal of progress made towards achieving the goals and recommendations of this Plan of Action should be undertaken every five years by the United Nations system. For this purpose the Secretary-General is invited to make appropriate arrangements taking account of the existing structure and resources of the United Nations system, and in co-operation with Governments It is suggested that the first such review be made in 1979 and be repeated each five years thereafter The findings of such systematic evaluations should be considered by the Economic and Social Council with the object of making, whenever necessary, appropriate modifications of the goals and recommendations of this Plan.

109. It is urged that both the monitoring and the review and appraisal activities of this Plan of Action be closely co-ordinated with those of the International Development Strategy for the Second United Nations Development Decade and any new international development strategy that might be formulated

Part Two

WORLD DEMOGRAPHIC SITUATION AND PROSPECTS

DEMOGRAPHIC TRENDS IN THE WORLD AND ITS MAJOR REGIONS, 1950-1970*

*United Nations Secretariat***

1. A profound alteration in the world's balance of births and deaths occurred in the years around 1950, as a result of which mankind's numbers now grow with incomparably greater speed than ever in history. Before examining the 1950-1970 period in detail it is useful to appreciate by how much the recent population growth differs from the past and to recognize why the acceleration has occurred with such apparent suddenness In 20 years, the world population grew by virtually one half The previous increase by one half took place in the 50-year interval from 1900 to 1950 and that was already a period of speedier growth than any preceding historic epoch.

2. To illustrate what has happened, a few figures [1] are brought together in table 1. The "more developed regions" comprise Northern America, Europe, the Soviet Union, Japan, Temperate South America and Australia and New Zealand. All other regions are here considered as "less developed"

3. In the more developed regions, population growth accelerated notably in the course of the nineteenth century, fluctuated in the present century in response to wars and economic crises and most recently has indicated a tendency to slow down In the less developed regions disruptive events of the past century kept population growth at a low level, but that growth was augmented to a par with the more developed regions in the

* The original text of this paper (E/CONF 60/BP/1) was [illegible]

[illegible]

[1] Many of the recent estimates presented in this paper are provisional and still subject to revision It is to be noted that estimates for China and large parts of Africa are particularly uncertain.

TABLE 1. WORLD POPULATION AT EACH HALF-CENTURY FROM 1750 TO 1950 AND AT EACH DECADE FROM 1900 TO 1970, DISTINGUISHING THE MORE DEVELOPED FROM THE LESS DEVELOPED REGIONS

Year	Population (millions)			Annual rate of increase since preceding date (percentage) [a]		
	World total	More developed regions	Less developed regions	World total	More developed regions	Less developed regions
By half-centuries						
1750	791	201	590			
1800	978	248	730	0.4	0.4	0.4
1850	1,262	347	915	0.5	0.7	0.5
1900	1,650	573	1,077	0.5	1.0	0.3
1950	2,506	857	1,649	0.8	0.8	0.9
By decades						
1900	1,650	573	1,077			
1910	1,775	650	1,125	0.7	1.3	0.4
1920	1,837	682	1,155	0.3	0.5	0.3
1930	2,044	759	1,285	1.1	1.1	1.1
1940	2,267	821	1,446	1.0	0.8	1.2
1950	2,506	857	1,649	0.9	0.4	1.2
1960	2,995	976	2,019	1.8	1.3	2.0
1970	3,621	1,084	2,537	1.9	1.1	2.3

[illegible]

[a] Exponential rates.

1920s and then, since about 1950, it shot up to unprecedentedly high levels.

4. The earlier acceleration of population growth in the more developed regions—which in view of the new facts now appears comparatively modest—has generated a great number of studies. A long and gradual decrease in death rates occurred as medical and sanitary knowledge improved. With economic and social progress, benefits of such knowledge coud be more widely bestowed upon the population at large. Decreases in birth rates followed while the death rates still continued their decline, so that the rate of natural increase never rose to an exceedingly high figure. Most recently, the death rates in the more developed regions have stopped declining, whereas birth rates are decreasing again, so that the margin of natural increase tends to be further reduced.

5. Medical discoveries and experience in the organization of public health work accumulated, but their massive application in the less developed regions was much delayed, especially by the economic crisis of the 1930s and the disorganization caused by war in the 1940s. The rapidity with which the accumulated medical, sanitary and organizational methods were released during a few years after 1945 is reflected in the abruptness with which the population growth of the less developed regions has accelerated since about 1950. Death rates since then were reduced still further, while the birth rates, on the whole, have changed little in recent years, hence there was a further acceleration within the 1950s and 1960s.

6. The impact of population growth varies from country to country, but the fact remains that the demographic gap between more developed and less developed regions is now extremely wide. Two figures suffice to bear this out. By the year 1970, the annual population growth in the more developed regions had shrunk to about 0.9 per cent and that of the less developed regions had expanded to 2.4. At the rate of 0.9 per cent a population can double once every 77 years; at 2.4 per cent it can double every 29 years.

GLOBAL OVERVIEW OF POPULATION TRENDS SINCE 1950

World population growth, absolute and relative magnitudes

7. As shown in table 2, the world population growth continued to accelerate between 1950 and 1970, from a rate of 1.8 per cent per annum in the 1950s to 1.9 per cent in the 1960s. This happened despite the slowdown in the growth of more developed regions (from

TABLE 2. POPULATION 1950, 1960 AND 1970 AND AVERAGE ANNUAL RATES OF POPULATION GROWTH PER DECADE, IN MAJOR AREAS AND REGIONS OF THE WORLD

	Population (millions)			*Rate of growth (percentage)*	
Region	*1950*	*1960*	*1970*	*1950-1960*	*1960-1970*
World total	*2,505.9*	*2,994.8*	*3,621.0*	*1.78*	*1.90*
More developed regions	857.3	975.8	1,084.2	1.29	1.05
Less developed regions	1,648.6	2,019.0	2,536.8	2.03	2.28
Africa	*219.2*	*272.0*	*351.7*	*2.16*	*2.58*
Eastern Africa	62.7	77.0	99.8	2.05	2.60
Middle Africa	26.1	31.6	40.2	1.91	2.41
Northern Africa	51.2	65.2	86.0	2.41	2.77
Southern Africa	14.4	18.2	24.2	2.35	2.87
Western Africa	64.9	80.1	101.5	2.11	2.36
Latin America	*164.1*	*216.1*	*284.2*	*2.75*	*2.74*
Caribbean	16.9	20.7	25.6	2.01	2.12
Middle America	35.8	48.7	67.0	3.07	3.19
Temperate South America*	25.5	30.9	36.4	1.92	1.64
Tropical South America	85.9	115.8	155.3	2.99	2.93
Northern America*	*166.1*	*198.7*	*226.4*	*1.79*	*1.31*
East Asia	*673.5*	*787.4*	*926.2*	*1.56*	*1.62*
East Asia (excluding Japan)	589.8	693.3	821.8	1.62	1.70
Japan*	83.6	94.1	104.3	1.18	1.03
South Asia	*698.4*	*865.4*	*1,111.3*	*2.14*	*2.50*
Eastern South Asia	173.1	218.5	284.9	2.33	2.65
Middle South Asia	480.8	588.4	749.1	2.02	2.41
Western South Asia	44.5	58.5	77.3	2.74	2.79
Europe*	*392.0*	*425.2*	*459.0*	*0.81*	*0.77*

TABLE 2 (continued)

Region	Population (millions) 1950	1960	1970	Rate of growth (percentage) 1950-1960	1960-1970
Eastern Europe*	88.5	96.7	102.9	0.89	0.62
Northern Europe*	72.5	75.8	80.3	0.45	0.57
Southern Europe*	108.6	118.1	127.7	0.84	0.78
Western Europe*	122.4	134.5	148.1	0.94	0.96
Oceania	*12.6*	*15.8*	*19.4*	*2.26*	*2.12*
Australia and New Zealand*	10.1	12.7	15.4	2.25	1.92
Melanesia	1.8	2.2	2.8	2.07	2.44
Micronesia and Polynesia	0.7	0.9	1.3	2.77	3.42
USSR*	*180.1*	*214.3*	*242.8*	*1.74*	*1.25*

Note: Regions marked with an asterisk are those considered "more developed"

1.3 to 1.1 per cent per annum), owing to the acceleration of population growth in the much more populous less developed regions (from 2.0 to 2.3 per cent) Population growth was speeded up in all regions of South Asia and Africa, in two regions of Latin America and in two regions of Oceania. In East Asia, if the estimates are correct, and also in Europe as a whole, growth seems to have remained near a constant level Marked slowdowns of population growth occurred in the Union of Soviet Socialist Republics, Northern America, Temperate South America, and Australia and New Zealand, those regions where there had been a historic expansion of settlements of a European origin

8. Taking the 20-year period as a whole, the population of the world rose by 44 per cent, the increases having been by 26 per cent in the combination of more developed regions and by 54 per cent in the less developed regions. The populations of major areas increased as follows: Europe by 17 per cent, the Soviet Union by 35 per cent; Northern America by 36 per cent, East Asia by 38 per cent; Oceania by 54 per cent, South Asia by 59 per cent; Africa by 60 per cent, and Latin America by 73 per cent. Thus, it happens that increases greater than 50 per cent occurred in those major areas which are situated mainly to the south of the Tropic of Cancer. Consequently, there was a notable shift southward in the average latitude of the world's population. the four southern major areas (South Asia, Africa, Latin America and Oceania) comprised 43.6 per cent of mankind's numbers in 1950, as against 48.8 per cent in 1970. They will probably soon contain the majority.

9. Among individual regions there was even greater diversity. Northern Europe, the region of slowest growth, gained 11 per cent. At the other extreme, the population of Middle America grew by 87 per cent in the same period of time. Countries or areas in which the population grew more than twofold in the 20 years include Costa Rica, Dominican Republic, Hong Kong, Israel, Kuwait, Singapore and Venezuela. Some of these countries or areas, however, received many immigrants. The 20-years gains amounted to an estimated 232 million in East Asia without Japan, and 268 million in Middle South Asia, as compared with 227 million in all the more developed regions combined

10. As a consequence of differi[illegible] rates of growth, the distribution of population among [illegible] world's regions was modified in several respects (see table 3) For instance, 28 per cent of the world population was in South Asia in 1950, while 31 per cent was there in 1970 Latin America's share in the world population rose from 6.5 per cent to 7.8 per cent On the other hand, Europe's share decreased from 15.6 to 12.7 per cent. For every 100 Latin Americans there were 239 Europeans in 1950, but only 162 in 1970, though the population of Europe had not ceased growing.

11. Of greatest importance perhaps is the distribution of the world population between more developed and less developed regions. As here defined, the share of the more developed regions in mankind's numbers decreased from 34.2 per cent in 1950 to 29.9 per cent in 1970.

12 Also shown in table 3 are the absolute and relative population gains of the 1950-1970 period The world population was augmented by an estimated 1,135 million, of which 227 million was in the more developed regions, and 888 million—almost 80 per cent of the world's gain—was in the less developed regions. The population gain of Europe, namely 67 million, was not much more than the gains, more than 60 million each, in the Soviet Union and in Northern America. Africa and Latin America, of smaller populations than Europe, nevertheless had far greater amounts of population gain, 132 million and 120 million, respectively. The largest increase, 413 million, or 36 per cent of the entire world population growth, occurred in South Asia.

13. One measure of the population pressures that might be generated upon natural resources can be derived from a comparison of population densities. It must be pointed out that this measure is very crude, since not all land areas are equally suited for human settlement. Arctic wastes, mountainous regions, deserts and tropical jungles make up extensive portions of the

TABLE 3. PERCENTAGE OF WORLD POPULATION IN MAJOR AREAS AND REGIONS OF THE WORLD, 1950 AND 1970, ABSOLUTE POPULATION GAINS BETWEEN 1950 AND 1970, AND PERCENTAGE SHARE OF MAJOR AREAS AND REGIONS IN THE WORLD POPULATION GAIN

Region	*Percentage of world population*		*Increase 1950-1970*	
	1950	*1970*	*Amount (millions)*	*Percentage of world increase*
World total	*100.0*	*100.0*	*1,115.1*	*100.0*
More developed regions	34.2	29.9	226.9	20.3
Less developed regions	65.8	70.1	888.2	79.7
Africa	*8.7*	*9.7*	*132.5*	*11.9*
Eastern Africa	2.5	2.8	37.1	3.3
Middle Africa	1.0	1.1	14.1	1.3
Northern Africa	2.0	2.4	34.8	3.1
Southern Africa	0.6	0.7	9.8	0.9
Western Africa	2.6	2.8	36.6	3.3
Latin America	*6.5*	*7.8*	*120.1*	*10.8*
Caribbean	0.7	0.7	8.7	0.8
Middle America	1.4	1.9	31.2	2.8
Temperate South America*	1.0	1.0	10.9	1.0
Tropical South America	3.4	4.3	69.4	6.2
Northern America*	*6.6*	*6.3*	*61.5*	*5.5*
East Asia	*26.9*	*25.6*	*252.7*	*22.7*
East Asia (excluding Japan)	23.5	22.7	232.0	20.8
Japan*	3.3	2.9	20.7	1.9
South Asia	*27.9*	*30.7*	*412.9*	*37.0*
Eastern South Asia	6.9	7.9	111.8	10.0
Middle South Asia	19.2	20.7	268.3	24.1
Western South Asia	1.8	2.1	32.8	2.9
Europe*	*15.6*	*12.7*	*67.0*	*6.0*
Eastern Europe*	3.5	2.8	14.4	1.3
Northern Europe*	2.9	2.2	7.8	0.7
Southern Europe*	4.3	3.5	19.1	1.7
Western Europe*	4.9	4.1	25.7	2.3
Oceania	*0.5*	*0.5*	*6.8*	*0.6*
Australia and New Zealand*	0.4	0.4	5.3	0.5
Melanesia	0.1	0.1	1.0	0.1
Micronesia and Polynesia	0.0	0.0	0.6	0.1
USSR*	*7.2*	*6.7*	*62.7*	*5.6*

Note: Regions marked with an asterisk are those considered "more developed".

land areas of certain regions. The density gains are shown in table 4.

14. The largest population concentrations in the world occur in the subcontinent of East Asia, Europe and India. Middle South Asia, East Asia and Europe taken together have a land area of 23,464,000 km² or 17.3 per cent of the world's land area (excluding the Antarctic continent). In 1970, they had a combined population of 2,134 million, or 58.9 per cent of the world population. Within the contours of the total land area, their average population density was 90.9 persons per km². The remainder of the world, comprising 41.1 per cent of its population within 82.7 per cent of its land area, was inhabited at an average density of 13.2 persons to the km², or one seventh that of the first group.

Trends in the components of population growth

International migration

15. During the past century and early in the present one, transoceanic migration from Europe contributed substantially to the settlement of previously sparsely inhabited regions of Northern America, Latin America and Oceania. On a slightly lesser scale were overseas movements from China and India to South-East Asia. In this connexion, attention is drawn to various migratory streams within large countries involving much distance: movements towards the south-east and east within the Soviet Union, towards the west in the United States of America and Canada, and towards the north-east within China. Transoceanic migration persists to the

TABLE 4. EXPECTATION OF LIFE AT BIRTH, 1935-1939 AND 1950-1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

(Years)

Region	1935-1939 [a]	1950-1955	1955-1960	1960-1965	1965-1970
World total	*About 35*	*47*	*50*	*53*	*55*
More developed regions	55	64 6	67.8	69.2	70 3
Less developed regions	About 30	42	45	48	51
Africa	*About 30*	*38*	*39*	*41*	*43*
Eastern Africa		36	38	40	42
Middle Africa		37	39	40	41
Northern Africa		43	45	47	49
Southern Africa		43	45	46	48
Western Africa		33	34	37	39
Latin America	*About 40*	*52*	*55*	*58*	*60*
Caribbean		52	55	58	61
Middle America	40	50	54	58	60
Temperate South America*	52	61.4	62 9	64 3	65 6
Tropical South America		*53*	*55*	*57*	*59*
Northern America*	*62*	*68 7*	*69 7*	*70 0*	*70.5*
East Asia		*45*	*51*	*55*	*60*
East Asia (excluding Japan)	About 30[b]	45	50	54	58
Japan*	49	61.9	66 9	69 0	70.9
South Asia	.	*41*	*43*	*46*	*48*
Eastern South Asia		42	45	47	49
Middle South Asia	About 30	40	42	45	47
Western South Asia	About 30	44	46	49	51
Europe*	*58*	*65.4*	*67.9*	*69.6*	*70 7*
Eastern Europe*	54	63.2	66.5	68.7	69 6
Northern Europe*	63	69 4	70 6	71.3	71 9
Southern Europe*	53	63.3	66 4	68 2	69 8
Western Europe*	62	67 6	69 3	70.7	71 4
Oceania	.	*65*	*66*	*67*	*68*
Australia and New Zealand*	66	69.6	70 5	71.3	71.8
Melanesia		40	42	44	46
Micronesia and Polynesia		45	52	56	60
USSR*	47	*61.7*	*67.4*	*68.9*	*70.3*

[illegible] (Un[illegible] *in 1963* [illegible] ling to [illegible] *Wor*[illegible])

[b] Including Eastern South Asia

present day, but in relation to the increased population size in the regions of destination it no longer has such large importance.

16 Great population upheavals were caused by the [illegible] subcontinent, parts of East Asia and the Middle East. Especially in Europe, millions of temporarily homeless persons were repatriated, absorbed or rehabilitated in their countries of refuge, or assisted in migrating to other receiving countries, notably those of traditional overseas settlement. The greater part of this work of resettlement was accomplished by 1950 or soon thereafter so far as Europe, Japan and the Republic of Korea are concerned. Greater difficulties have persisted in the economic and social absorption of millions of refugees in Bangladesh, India and Pakistan, in the Middle East and in the Republic of Viet-Nam. Politically motivated migration occurred after certain events in Eastern Europe and Cuba.

17. The majority of international migrants within the 1950-1970 period, however, have been motivated by economic reasons. These migrants no longer affect population growth on a continental scale, but are important in a number of countrie or th sma

populations (e.g., Hong Kong, Ireland, Israel, Jamaica, Kuwait, Lesotho, Malta, Paraguay and Singapore) and even some of larger population (Australia, Canada, Greece, Portugal and Venezuela). In a number of European countries, where the rate of natural population increase is low, migration notably affects the modest rates of population growth.

18. The attempt has been made to calculate migratory balances as the differences between intercensal population growth and recorded natural population increase. These calculations suggest that between 1950-1970, Western Europe gained 8.7 million migrants, Southern Europe lost 7.3 million, Eastern Europe lost 3.8 million and Northern Europe lost 0.7 million, so that the four regions of Europe combined—unlike previous history—had an outward migration of 3.0 million, most of it during 1950-1960 and very little during 1960-1970. This new situation has resulted in large part from a reorientation of many European migrants towards France, the Federal Republic of Germany, Sweden, Switzerland and a few other European countries rather than towards overseas countries. In addition, migration into Europe has sprung up from northern Africa, Turkey and some previously colonial countries overseas.

19. The historic regions of European overseas settlement continued to receive many migrants. Preliminary estimates for 1950-1970 suggest an inward migration of 6.9 million to the United States of America, 1.8 million to Canada, and 1.7 million to Australia. Many of these migrants still came from Europe; but, notably in the United States of America, the proportion of European among the immigrants declined while that from Latin America and the Caribbean region, especially from Mexico and Cuba, became rather large and that of Asians, for instance from the Philippines, also became significant. Since many previous European immigrants to Latin America chose to return to Europe, the migratory balance of Latin America as a whole has become slightly negative. Within Latin America and within Africa, there are known to be several currents of international migration, but the paucity of statistics prevents an assessment of their magnitude.

Mortality

20. To sharpen the perspective on recent developments the comparisons to which reference will be made include estimates for 1935-1939 (a period of five calendar years) as well as for five-year periods between 1950 and 1970 (the latter calculated from mid-year to mid-year). Estimated death rates are shown in table 5.

21. In 1935-1939, the average death rate in the more developed regions was about 15 per 1,000. Fifteen years later, in 1950-1955, it was about 10 per 1,000. However, in the ensuing 15 years, up to 1965-1970, this rate fell to 9 per 1,000 and no further reduction is suggested by the trend in the most recent years.

22. In most of the less developed regions, the 1935-1939 average death rate has been estimated in the range of 30-35 per 1,000, but in Latin America (considered as a whole), it may have been 20-25 per 1,000. By 1950-1955, the average death rate of all the less developed regions combined is estimated to have come down to 24 per 1,000—and that of Latin America to 15 per 1,000—certainly a large decrease as compared with earlier conditions. Furthermore, it is estimated that the decrease of death rates, in these regions, continued to reach a combined average of 16 per 1,000 in 1965-1970 (and 10 per 1,000 in Latin America). This figure is not much above the level in more developed regions 30 years previously, but it does not represent similarly favourable health conditions: owing to differences in the population's age composition, crude death rates in the less developed regions would have to fall significantly below those in the more developed regions to reflect equal risks of death, age by age.

23. The proportion of elderly people in more developed regions is high and rising, thereby setting limits to the lowest level of death rates attainable even with the most ample medical and sanitary services. In spite of probable further progress in health matters, the crude death rates in the more developed regions are no longer expected to fall. In fact, with the rising proportion of older people, they are now more likely to increase gradually. In the less developed regions, the proportion of elderly persons has been, and will long remain, rather low. In such populations crude death rates can fall very rapidly and, eventually, to extremely low levels.

24. The aging of populations is mostly the consequence of birth-rate levels in the more or less distant past.[2] Since large decreases in birth rates occurred rather recently in Japan and the Soviet Union, the aging of their populations has not yet progressed very far. Consequently, among large countries, Japan and the Soviet Union have now the lowest crude death rates, a temporary advantage soon to be lost as the proportion of aged population is now bound to increase. But death rates as low as 5.0-5.9 per 1,000 have recently been reported in American Samoa, the British Virgin Islands, Fiji, Hong Kong and Singapore,[3] all of them areas with hitherto or still high birth rates where progress in public health has also been exceptional. These latter observations indicate how low the death rates in the less developed regions can fall before an aging of the population, due to reduced birth rates, causes them to rise again. It is mainly for this reason that, despite eventual fertility declines, a long period of rapid population growth must still be foreseen in all the less developed countries of hitherto high fertility. Only after many decades, when low fertility has resulted in a greatly modified population age structure, is there any

[2] Mortality changes and migration also have some influence on a population's age structure, but in most national populations these effects are minor as compared with those due to varied levels and trends in past birth rates.

[3] *Population and Vital Statistics Report, Data Available as of 1 July 1972* (United Nations publication, ST/STAT/SER.A/101).

TABLE 5. BIRTH RATES, 1935-1939 AND 1950-1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

(Rates per 1,000 inhabitants)

Region	1935-1939 [a]	1950-1955	1955-1960	1960-1965	1965-1970
World total	*34-38*	*36*	*35*	*34*	*33*
More developed regions	24 9	22 7	21 9	20 3	18 0
Less developed regions	40-45	43	42	40	39
Africa	*40-45*	*47*	*47*	*47*	*46*
Eastern Africa		47	47	47	47
Middle Africa		45	45	45	45
Northern Africa		46	46	46	45
Southern Africa		42	42	42	42
Western Africa		48	48	48	48
Latin America	*40-45*	*41*	*40*	*39*	*37*
Caribbean		38	38	37	35
Middle America		46	45	44	43
Temperate South America*	27 6	26 9	27 0	26 5	24 4
Tropical South America		45	43	40	39
Northern America*	*18.1*	*25 1*	*24 9*	*22 3*	*18 1*
East Asia		*36*	*31*	*29*	*27*
East Asia (excluding Japan)	40-45[b]	37	33	30	28
Japan*	29 3	23 0	18 2	17 5	17 9
South Asia		*46*	*46*	*45*	*44*
Eastern South Asia		46	46	45	44
Middle South Asia	40-45	46	46	44	43
Western South Asia	40-45	46	46	45	44
Europe*	*20 4*	*19 7*	*19 2*	*18 6*	*17 6*
Eastern Europe*	23 1	23 5	21 0	17 2	16 9
Northern Europe*	15 8	16 6	16 8	18 0	17 1
Southern Europe*	24 3	21 1	20 8	20 6	19 3
Western Europe*	17 3	17 5	17 7	18 2	16 8
Oceania		*28*	*28*	*27*	*24*
Australia and New Zealand*	17 6	23 5	23 3	23 3	20 4
Melanesia		43	43	43	43
Micronesia and Polynesia		44	44	44	43
USSR*	*36 0*	*26 2*	*25.3*	*22 0*	*17 7*

[b] Including Eastern South Asia

likelihood of a near balance between the birth rate and the death rate.

25 The infant mortality rate (deaths in the first year of life per 1,000 live births) has come into wide use as an indicator of social conditions Unfortunately, it cannot be estimated with much accuracy except in the countries where vital statistics registers have attained high degrees of accuracy Until late in the nineteenth century, 200 or more of every 1,000 infants born failed to survive their first year of life even in those countries which now enjoy the most advanced levels of health It is probable that in extensive parts of Africa and some Asian countries infant death rates are still extremely high In sharp contrast, around 1970, infant mortality rates as low as 11-15 per 1,000 were registered in Finland, France, Iceland, Japan, the Netherlands, Norway and Sweden In some small countries or areas situated in the less developed regions, the most recently reported rates were below 30 (e g., American Samoa, Jamaica, Martinique and Puerto Rico), as low as 20 (the Netherlands Antilles and Singapore), or even slightly less (Fiji, Hong Kong and Western Samoa), but such low rates are still very far from achievement in the less developed countries of larger population Regional average rates in 1935-1939, 1950-1954 and 1965-1969 are brought together in table 6. It be d out

TABLE 6. INFANT MORTALITY RATES, 1935-1939, 1950-1954 AND 1965-1969, IN THE WORLD AND IN THE MORE DEVELOPED REGIONS

(Deaths in the first year of life per 1,000 live births)

Region	1935-1939	1950-1954	1965-1969
World total[a]	*200*	*150*	*120*
More developed regions	106	57	27
Less developed regions[a]	230	180	140
Europe	*93*	*58*	*29*
Western Europe	66	45	21
Southern Europe	119	73	41
Eastern Europe	128	84	34
Northern Europe	57	29	18
USSR	166	75	26
Northern America	55	29	23
Japan	110	53	17
Temperate South America	136	83	66
Australia and New Zealand	40	24	18

[a] Approximation for less developed regions based on relationship between general mortality and infant mortality according to model life tables.

that the averages estimated for less developed regions, in relation to available model life tables, are largely conjectural. It is possible that, taken as a whole, the less developed regions had twice the infant mortality rate of the more developed regions in 1935-1939, three times the rate in 1950-1954 and five times the rate in 1965-1969. It can thus be said that while the gap in the world's crude death rates and expectations of life is now narrowing, the gap in infant mortality rates, despite universal progress, is still widening. High fertility may be among the causes of persistence of high rates of inf mortality. High rates of infant mortality, on the ot hand, may retard the emergence of the new motivati which can be conducive to the regulation of fertility is possible to argue that the relationship between ferti and infant mortality is partially in the nature o vicious circle, but the lack of reliable statistics impe any close investigation of this important subject.

26. A measure of general mortality independent the population's age structure is the expectation of at birth, in years (for both sexes combined). Estima for all regions are shown in table 7. It appears that the more developed regions expectations of life avera 55 years in 1935-1939, 65 years in 1950-1955, and years in 1965-1970. It is noteworthy that in 1935-19 the level already exceeded 60 years in Western a Northern Europe, Northern America and Australia a New Zealand, was still below 55 years in Southern a Eastern Europe and Temperate South America a below 50 years in Japan and the Soviet Union. But th areas which still lagged behind the most advanced regi have now caught up with them. In eight of the n more developed regions, life expectancy in 1965-19 was within the narrow range of 70-72 years; a in Temperate South America, it was 66 years.

27. While mortality conditions have become alm uniform in the more developed regions, they ha probably become more diverse in the less develop regions. Here, the expectation of life, for the combin group, may have averaged 30 years in 1935-1939, years in 1950-1955, and 51 years in 1965-19 Recently the expectancy was already as high as 60 ye in many countries of Latin America, while it was o 40 years or less in many countries of Africa. In all the regions much progress remains to be made.

TABLE 7. RATES OF NATURAL INCREASE, 1935-1939 AND 1950-1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

(Rates per 1,000 inhabitants)

Region	1935-1939[a]	1950-1955	1955-1960	1960-1965	1965-1970
World total	*9-12*	*17*	*19*	*19*	*19*
More developed regions	10.2	12.6	12.6	11.3	8.8
Less developed regions	9-13	19	22	22	23
Africa	*8-12*	*21*	*23*	*25*	*26*
Eastern Africa	...	21	23	25	27
Middle Africa	...	18	20	23	24
Northern Africa	...	23	25	27	28
Southern Africa	...	23	24	25	26
Western Africa	...	20	22	23	24
Latin America	*18-22*	*26*	*27*	*28*	*27*
Caribbean	...	23	25	25	24
Middle America	...	30	32	33	33
Temperate South America*	12.7	17.1	17.4	16.9	15.1
Tropical South America	...	30	30	29	29
Northern America*	*7.2*	*15.7*	*15.6*	*13.0*	*8.8*
East Asia	...	*16*	*16*	*16*	*16*
East Asia (excluding Japan)	8-12[b]	16	16	17	17
Japan*	11.9	13.9	10.4	10.2	11.1

TABLE 7 (*continued*)

Region	1935-1939[a]	1950-1955	1955-1960	1960-1965	1965-1970
South Asia		*20*	*23*	*24*	*26*
Eastern South Asia		22	25	26	27
Middle South Asia	8-12	19	22	23	25
Western South Asia	8-12	25	27	27	28
Europe*	*6.3*	*8 7*	*8 8*	*8 4*	*7.2*
Eastern Europe*	8 0	12 3	11 0	7.8	7.0
Northern Europe*	3 7	5 5	5 8	6 8	5 9
Southern Europe*	8 8	10 8	11 2	11 2	10 0
Western Europe*	4 1	6 2	6 5	7 2	5 6
Oceania		*16*	*17*	*17*	*14*
Australia and New Zealand*	8 1	14 2	14 4	13 5	11 5
Melanesia		19	22	24	25
Micronesia and Polynesia		26	29	33	35
USSR*	18 0	17 0	17 7	14 8	10 0

Source: Estimates available to the United Nations Secretariat as of March 1974

[b] Including Eastern South Asia

Fertility

28. The crude birth rates shown in table 8 reflect fairly well the variations in fertility. They are also affected by differences in population age structure, but not nearly to the same extent as are the crude death rates. An almost categoric difference can be noted between more developed and less developed regions. [4]

29 For the group of more developed regions, the birth rate averaged 25 per 1,000 in 1935-1939, 23 per 1,000 in 1950-1955, and 18 per 1,000 in 1965-1970 This gradual subsidence of the average birth rate was a result of divergent trends among particular regions and countries. In 1935-1939, for instance, birth rates were the lowest in Western and Northern Europe, Northern America and Australia and New Zealand, all of them regions in which the historic transition from "high" to "low" rates—both the death rates and the birth rates—had begun comparatively early and where economic and social development and progress in public health were the most advanced. In Southern and Eastern Europe, the birth-rate decline—incidentally also the death-rate decline—was still in progress; and in Japan and the Soviet Union, it was then still in an earlier phase. Actually, in the Soviet Union, the previously declining birth rate was then temporarily boosted as a result of the prohibition of previously legal induced abortions For the same reason, a temporary boost occured in the birth rate of Romania in 1967 and ensuing years, but the rate is again decreasing.

30 During the period 1940-1945 and the period of post-war recovery (1945-1950), diverse changes in birth rates occurred in the more developed countries as they were affected by the war to a varying extent Already before the war (Austria and Germany) and during the war (Norway, Sweden and Switzerland) temporary recoveries in birth rates could be noted where these rates had previously been among the lowest. Countries heavily involved in the war suffered temporary birth deficits, in part recuperated by post-war "baby booms " In the countries of European overseas settlement, the relatively high post-war birth rates persisted almost to the end of the 1950s. In the meantime, however, in those of the more developed countries where the decrease in birth rates had not yet reached very low levels before the war, the birth-rate decline was promptly resumed.

31. As shown in table 9, birth rates in Europe and Japan subsided gradually after 1950 from initial levels around 20 per 1,000 to eventual levels between 17 and 19 per 1,000. By contrast, in the Soviet Union, Northern America and Australia and New Zealand birth rates remained near 25 per 1,000 throughout the 1950s, but recently these also subsided to levels comparable with Europe and Japan Except in Temperate South America, where the birth rate is still somewhat higher, current levels have become nearly equal in all the more developed regions. Some variations among individual countries persist; but on the whole it can be said that both the levels of mortality and those of fertility, in the more developed regions, have become nearly uniform. The varied timing of this development in the preceding decades suggests that some con on exists between

[4] A fairly exhaustive study has shown that no indicator of economic or social development discriminates as sharply be-

TABLE 8. PERCENTAGE COMPOSITION OF THE POPULATION BY THREE BROAD AGE GROUPS, 1950 AND 1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

Region	Percentage of 1950 population at ages			Percentage of 1970 population at ages		
	0-14	*15-64*	*65+*	*0-14*	*15-64*	*65+*
World total	*36.1*	*59.0*	*4.9*	*36.4*	*58.1*	*5.5*
More developed regions	27.9	64.6	7.5	26.7	63.7	9.6
Less developed regions	40.5	56.0	3.5	40.6	55.6	3.8
Africa	*42.8*	*53.9*	*3.3*	*44.3*	*52.7*	*3.0*
Eastern Africa	43.1	53.6	3.3	45.2	51.6	3.2
Middle Africa	41.8	54.9	3.3	42.9	54.3	2.8
Northern Africa	42.3	54.2	3.5	44.4	52.5	3.1
Southern Africa	39.2	56.3	4.5	40.9	55.0	4.1
Western Africa	44.0	53.2	2.8	44.7	52.8	2.5
Latin America	*41.0*	*55.7*	*3.3*	*42.8*	*53.5*	*3.7*
Caribbean	39.9	56.2	3.9	41.8	53.5	4.7
Middle America	43.5	53.0	3.5	46.4	50.2	3.4
Temperate South America*	31.8	63.5	4.7	31.7	61.7	6.6
Tropical South America	42.9	54.3	2.8	44.0	53.0	3.0
Northern America*	*27.2*	*64.7*	*8.1*	*28.4*	*61.9*	*9.7*
East Asia	*38.8*	*57.0*	*4.2*	*33.6*	*61.0*	*5.4*
East Asia (excluding Japan)	39.2	56.8	4.0	34.9	59.9	5.2
Japan*	35.4	59.7	4.9	24.0	68.9	7.1
South Asia	*40.4*	*56.3*	*3.3*	*42.7*	*54.2*	*3.1*
Eastern South Asia	42.5	54.8	2.7	43.4	53.6	3.0
Middle South Asia	39.6	56.9	3.5	42.4	54.6	3.0
Western South Asia	40.6	56.1	3.3	43.1	53.2	3.7
Europe*	*25.4*	*65.1*	*9.5*	*24.9*	*63.7*	*11.4*
Eastern Europe*	26.7	66.3	7.0	24.6	65.0	10.4
Northern Europe*	23.5	66.2	10.3	24.2	63.1	12.7
Southern Europe*	27.8	64.8	7.4	24.3	65.9	9.8
Western Europe*	23.4	66.5	10.1	24.2	63.0	12.8
Oceania	*29.8*	*62.9*	*7.3*	*32.1*	*60.6*	*7.3*
Australia and New Zealand*	27.0	64.7	8.3	29.4	62.2	8.4
Melanesia	40.4	56.4	3.2	42.5	54.5	3.0
Micronesia and Polynesia	44.1	52.4	3.5	43.0	54.2	2.8
USSR* ...	*30.1*	*63.8*	*6.1*	*28.6*	*63.6*	*7.8*

Note: Regions marked with an asterisk are those considered "more developed".

the decline in fertility and the preceding decline in mortality.

32. For all the less developed regions, the birth rate of 1935-1939 has been vaguely estimated in the 40-45 range, but knowledge acquired more recently makes it appear that this could have been an underestimate in the instances of South Asia and Africa and an overestimate in the cases of China and the Caribbean region. It is no longer believed—as at the time when those estimates were made (1949)—that birth rates in less developed regions necessarily tend towards the same high level. Differences in the average age at marriage, the duration of breast-feeding, health conditions and a variety of customs and usages have the consequence that—in the complete absence of modern means of fertility regulation—birth rates may sometimes be as high as 55 and sometimes no more than 35 per 1,000. Clearly, these two figures are twice as large as those now delimiting the typical range of birth rates in the more developed countries. Because of the width of this range, there is some likelihood that high birth rates, uninfluenced by any modern birth-control practices, can also fluctuate in the course of time, a fact borne out in a few countries with sufficient and reliable statistics. However, in view of the rapid moderation of death rates, this possibility is now only of secondary importance. The birth rates prevailing in the less developed countries are *traditional* and *still* correspond to the conditions when the expectation of life was rather short. The moderation of birth rates takes definite form once they decline distinctly below 35 per 1,000, this being near the critical level which in the past two decades has

TABLE 9 TOTAL POPULATION, URBAN POPULATION AND PERCENTAGE URBAN IN TOTAL POPULATION, 1950 AND 1970, IN MAJOR AREAS AND REGIONS OF THE WORLD

Region	Total population (millions)		Urban population (millions)		Percentage urban	
	1950	1970	1950	1970	1950	1970
World total	*2,505.9*	*3,621.0*	*691.5*	*1,315.2*	*27.6*	*36.3*
More developed regions	857.3	1,084.2	435.7	692.8	50.8	63.9
Less developed regions	1,648.6	2,536.8	255.9	622.5	15.5	24.5
Africa	*219.2*	*351.7*	*28.4*	*74.7*	*12.9*	*21.2*
Eastern Africa	62.7	99.8	3.2	10.4	5.0	10.5
Middle Africa	26.1	40.2	1.6	6.8	6.0	16.9
Northern Africa	51.2	86.0	12.0	30.9	23.5	35.9
Southern Africa	8.9	14.2	5.4	10.0	37.8	41.2
Western Africa	64.9	101.5	6.2	16.6	9.5	16.3
Latin America	*164.1*	*284.2*	*67.1*	*161.0*	*40.9*	*56.7*
Caribbean	16.9	25.6	5.6	11.3	32.9	44.0
Middle America	35.8	67.0	14.2	36.0	39.5	53.7
Temperate South America*	25.5	36.4	16.0	28.1	62.8	77.4
Tropical South America	85.9	155.3	31.4	85.7	36.5	55.2
Northern America*	*166.1*	*226.4*	*105.7*	*167.9*	*63.6*	*74.2*
East Asia	*673.5*	*926.2*	*99.1*	*245.7*	*14.7*	*26.5*
East Asia (excluding Japan)	589.8	821.9	69.6	190.1	11.8	23.1
Japan*[a]	83.6	104.3	29.5	55.5	35.3	53.2
South Asia	*698.4*	*1,111.3*	*108.2*	*230.9*	*15.5*	*20.8*
Eastern South Asia	173.1	284.9	23.8	56.2	13.7	19.7
Middle South Asia	480.8	749.1	74.1	144.8	15.4	19.3
Western South Asia	44.5	77.3	10.3	29.9	23.3	38.7
Europe*	*392.0*	*459.0*	*204.0*	*284.1*	*52.1*	*61.9*
Eastern Europe*	86.5	102.9	37.3	54.7	43.2	53.2
Northern Europe*	72.5	80.3	51.3	59.3	70.8	73.9
Southern Europe*	108.6	127.7	38.1	59.4	35.1	46.5
Western Europe*	122.4	148.1	77.4	110.7	63.2	74.7
Oceania	*12.6*	*19.4*	*8.1*	*13.6*	*64.8*	*74.7*
Australia and New Zealand*	10.1	15.4	8.0	12.9	78.7	84.2
Melanesia	1.8	2.8	0.0	0.3	2.0	10.2
Micronesia and Polynesia	0.7	1.3	0.1	0.3	20.6	27.6
USSR*	*180.1*	*242.8*	*70.9*	*137.3*	*39.4*	*56.6*

Note: Regions marked with an asterisk are those considered "more developed"
[a] Urban population is that of "densely inhabited districts"

clearly separated the more developed from the less developed countries. As witnessed by history in the more developed countries, once a birth rate moves below this critical mark it is likely to continue its decline until it settles at a much lower level

33. Various fragmentary evidence has led to estimates implying a very slow decline in the average birth rate of the less developed regions, from 43 per 1,000 in 1950-1955 to 39 per 1,000 in 1965-1970. In Africa, where information is also vague, the estimates imply that the high birth rates may have remained near a constant level. A gradual subsidence in the prevailingly high birth rates is implied in estimates for South Asia and Latin America. This does not yet signify that deliberate methods of fertility regulation have become the accepted practice of any substantial proportion of the populations concerned In fact, in view of probably considerable decreases of mortality in infancy and early childhood, a small decrease in crude birth rates can be the mere consequence of minor changes in population age structure. A decrease in child mortality produces, at first, an increase in the proportion of children in relation to the total population. The crude birth rate, however, is calculated in relation to the total population irrespective of its composition by age groups. The crude birth rate may then rise again—assuming constant fertility—when the more numerous surviving children reach the reproductive age span.

34 In a number of countries with reviously high birth rates, reliable data s decrea 1 magnitude

sufficient to indicate that deliberate practices of fertility regulation are becoming widespread. Some relevant figures are presented in table 10. It will be noted that those countries or areas are situated mostly at the peripheries of Africa, Latin America and Asia. In addition to these, but not yet so accurately documented, noteworthy decreases in the birth rate have also occurred recently in Chile, Egypt and the Republic of Korea. While similar trends cannot yet be observed in many countries of large population, the birth rate decreases illustrated here have only a marginal effect on the world situation in general. Yet it is possible that they herald similar changes about to begin also in larger countries.

35. Except for some countries such as those in table 10, it remains true that the less developed regions are those where the birth rate is still well above 30 per 1,000. The findings of a study of correlations among fertility levels and other indicators of economic and social development, conducted in 1963, showed that this was the sharpest distinguishing function between more developed and less developed countries.[5] Though some individual countries have begun to depart from this general rule, where entire world regions are concerned the previous relationship still holds true. If anything, in the world-wide comparison the disparity has even widened. In 1950-1955, the average birth rate of the less developed regions was somewhat less than twice the average rate in the more developed regions; in 1965-1970, it was more than twice the average of the latter (see table 5).

TABLE 10. BIRTH RATES, 1960-1964, 1965-1969 AND 1970, IN SELECTED COUNTRIES OR AREAS

(Rates per 1,000 inhabitants)

Country or area	*1960-1964*	*1965-1969*	*1970*
Mauritius	38.9	31.8	26.0
Réunion	44.0	38.9	31.2
Tunisia	46.2	40.6	36.1
Chile	35.1	29.8	25.2[a]
Costa Rica	46.1	39.6	33.8
Guadeloupe	36.4	32.5	28.3
Martinique	35.3	31.0	27.4
Trinidad and Tobago	37.1	28.6	24.3
Hong Kong	34.2	24.9	20.0
Singapore	35.6	26.9	23.0
Sri Lanka	35.1	32.1	29.4
West Malaysia	39.2	32.9	29.9
American Samoa	42.2	36.6	34.6
Fiji	39.2	32.9	29.9

[a] 1969.

Natural increase

36. In the more developed regions, natural increase averaged 10 per 1,000 in 1930-1939, almost 13 per 1,000 in 1950-1955, but less than 9 per 1,000 by 1965-1970. The post-war revival of birth rates in many countries, and marked falls in the death rates of several others, produced this temporary spurt, followed more recently by a renewed subsidence.

37. In the less developed regions, the average rate of natural increase in 1935-1939 may also have been near 10 per 1,000, not differing much from the rate in the more developed regions. While the average birth rate was certainly much higher, the death rate also was higher by about the same amount, leaving approximately the same balance. By 1950-1955, the rate of natural increase in the less developed regions was almost double that amount, namely 19 per 1,000; and by 1965-1970 the margin between birth rates and death rates had become even wider, causing a natural increase of about 23 per 1,000.

Absolute numbers

38. Making use of average estimates for 1935-1939, and extrapolating the rates for periods from 1950 to 1970 to the years 1950 and 1970, one can obtain estimates of the absolute numbers of occurrences of births, deaths and natural increase in the years 1937, 1950 and 1970. Summary results, distinguishing only the groups of more developed and less developed regions, are shown in table 11.

39. It can be inferred that in the world as a whole there were 81 million births in 1937, 92 million in 1950, and 117 million in 1970. In the more developed regions, the annual number of births, about 20 million or

TABLE 11. NUMBERS OF BIRTHS, DEATHS AND NATURAL INCREASE, 1937, 1950 AND 1970, IN THE WORLD AND IN THE GROUPS OF MORE DEVELOPED AND LESS DEVELOPED REGIONS

(Millions)

Region	*Births*	*Deaths*	*Natural increase*
1937			
World total	*81*	*58*	*23*
More developed regions	20	12	8
Less developed regions	61	46	15
1950			
World total	*92*	*52*	*40*
More developed regions	20	9	11
Less developed regions	72	43	29
1970			
World total	*117*	*48*	*69*
More developed regions	19	10	9
Less developed regions	98	38	60

[5] *Population Bulletin of the United Nations, No. 7, 1963, with special reference to conditions and trends of fertility in the world;* see, in particular, chap. IX. It was found that of 11 indicators none distinguished as sharply between more developed and less developed countries as did the gross reproduction rate (number of children born to the average woman during her reproductive life span). Other indicators examined included *per capita* income, energy consumption, urbanization, non-agricultural activities, hospital beds, life expectancy, infant mortality, early marriage, literacy, newspaper circulation, radio receivers and cinema attendance.

somewhat less, has changed little since 1937, but it may be becoming smaller each year. In the less developed regions, meanwhile, the annual number of births grew from over 60 million in 1937 and over 70 million in 1950 to almost 100 million in 1970

40. In the more developed regions, the annual number of deaths decreased from nearly 12 million in 1937 to 9 million in 1950, but increased again to 10 million in 1970. As a net result, the amount of natural increase in the more developed regions was only slightly more in 1970 (9 million) than it had been in 1937 (8 million). In the less developed regions, meanwhile, the number of deaths decreased somewhat, from 46 million in 1937 to 43 million in 1950 and 38 million in 1970 During the same time, the annual amount of natural increase in the less developed regions quadrupled, from about 15 million in 1937 to about 60 million in 1970.

Changes in population composition and rural-urban distribution

Age composition of the population

41. Data on a population's age structure are important in gauging the magnitude of specific economic and social needs Where the child population is relatively large, investments in school facilities will have to be commensurate if a given standard of general education is to be achieved. Where young adults are comparatively numerous, corresponding pressures on employment opportunities and housing space will have to be reckoned with Where the proportion of aged persons is considerable, provisions for services needed by them will have to be made in proportion

42 Table 8 shows proportions of children (aged 0-14), working adults (aged 15-64) and elderly people (aged 65 years and over) in various parts of the world as estimated for 1950 and 1970. According to these figures, in 1970 the proportion of children was 27 per cent in more developed regions, as against 41 per cent in the less developed regions. In the first group, this represents a decrease since 1950, while in the second group there has been no notable change. The proportion of elderly people, in 1970, was nearly 10 per cent in the more developed regions, but less than 4 per cent in the less developed regions. It can be seen that in the first group of regions this proportion has increased significantly since 1950. As a result, persons of working ages in 1970 constituted 64 per cent of the population in the more developed regions, as against 56 per cent in the less developed regions In both sets of regions, for different reasons, this proportion has decreased somewhat. Two extreme instances may be cited In Japan, the proportion in the group of working ages rose from 60 per cent in 1950 to 69 per cent in 1970, a remarkable change due mostly to the decline in birth rates. In Middle America, meanwhile, that proportion decreased from 53 per cent to 50 per cent, in part because of reduced infant and child mortality and hence an increased proportion of surviving children. From the standpoint of economic productivity, a population age structure like that of the more developed regions has a greater efficiency than that of the less developed regions

43. The relative burden of the population in dependent ages upon the population in working ages is often expressed as the "dependency ratio", this being the ratio of persons aged under 15 and 65 years and over to 100 persons aged 15-64 years Table 12 brings together the dependency ratios for major world areas In 1970, these were as high as 90 per 100 in Africa, 87 in Latin America, 84 in South Asia, 65 in Oceania, 64 in East Asia, 62 in Northern America and 57 both in Europe and in the Soviet Union. As compared with 1950, the ratio has deteriorated considerably in South Asia, Northern America, Latin America and Oceania, and to some extent also in Europe and Africa, it did not change in the Soviet Union, and has improved markedly in East Asia

Table 12 Dependency ratios, 1950 and 1970, in the world and eight major areas

(Persons aged under 15, and 65 and over, per 100 aged 15-64 years)

Area	*1950*	*1970*	*Change 1950-1970*
World total	69	72	+ 3
More developed regions	55	57	+ 2
Less developed regions	79	80	+ 1
Africa	86	90	+ 4
Latin America	80	87	+ 7
Northern America	55	62	+ 7
East Asia	75	64	−11
South Asia	78	84	+ 6
Europe	54	57	+ 3
Oceania	59	65	+ 6
USSR	57	57	0

44. Special attention should be given to the age group 15-24 years These are the ages when formal education is usually completed, gainful work is sought for the first time, geographical mobility is the greatest and new marital unions may be formed The accommodation found by late adolescents and young adults can determine economic and social circumstances for a considerable future period. The pressure exercised by young entrants into the labour market can be gauged from the ratio of persons aged 15-24 years to those aged 15-64 years, as indicated in table 13 It will be noted that this ratio has been, and has remained, between 34 and 35 to 100 in South Asia, Africa and Latin America, and slightly lower in East Asia. In Europe, the ratio has remained between 24 and 25 per 100 Large changes occurred, on the other hand, in the Soviet Union, where the ratio decreased from 32 to 26, and in Northern America, where the ratio rose from 23 to 29. In Oceania also, the ratio rose markedly. It can be presumed that a fall in the ratio brings about a relative shortage of young labour, whereas a rise in the ratio makes itself felt through an increased competition for gainful employment.

TABLE 13. RATIO OF PERSONS AGED 15-24 YEARS PER 100 PERSONS AGED 15-64 YEARS, 1950 AND 1970, IN THE WORLD AND EIGHT MAJOR AREAS

Area	*1950*	*1970*
World total	*31.7*	*31.3*
More developed regions	26.7	26.2
Less developed regions	34.7	33.8
Africa	35.1	35.3
Latin America	34.1	35.2
Northern America	22.8	28.9
East Asia	33.3	31.9
South Asia	35.6	34.1
Europe	24.5	24.4
Oceania	24.7	29.3
USSR	32.4	26.3

Urban and rural population

45. Together with the shift of activities from agriculture to industry and services, there has also occurred a large and rapid transformation of the human habitat. Even in highly developed countries, with superior material and administrative resources, the rapid growth of cities to sizes unknown before has caused taxing problems of pollution, traffic congestion, shortage of housing, insufficient sanitation, social friction, delinquency and aesthetic environmental degradation. In less developed countries, cities now grow with even greater speed and resources are meagre for coping with the essential problems in securing minimal conditions compatible with dignified human existence. Nevertheless, according to many surveys, in improvised or squatter settlements surrounding those cities, migrant residents of rural origin usually claim that living conditions in the rural areas were even worse. Thus, despite their known evils, cities keep on attracting rural migrants.

46. According to the various national definitions in use, 28 per cent of the world population resided in urban localities in 1950, and 36 per cent in 1970 (see table 9). During those 20 years, the urban population of the world nearly doubled, from 692 million to 1,315 million. Sixty-four per cent of the population of the more developed regions, and 25 per cent of the less developed regions, were urban residents in 1970. The percentage level was as high as 75 in Oceania, 74 in Northern America, 62 in Europe, 57 in the Soviet Union and Latin America, 27 in East Asia and 21 in South Asia and Africa. In the preceding 20 years, the rise in level of urbanization had been considerable in every region and greatest in the Soviet Union, Latin America and East Asia.

47. As shown in table 14, the world urban population has grown during 1950-1970 at an average annual rate of 3.2 per cent and the rural population at a rate of 1.2 per cent. Thus, despite the very rapid increases in the world's cities and towns, the over-all growth of world population was so fast that rural population did not cease growing. In fact, during the 20 years, the following changes occurred: the urban population of the more developed regions increased by 257 million and that of the less developed regions by 367 million; the rural population of the more developed regions declined by 30 million, but the rural population of the less developed regions grew by 522 million, and this is the largest of the four figures. In South Asia alone, the rural population increased by 290 million. In East Asia, on the other hand, the urban gain is estimated at 147 million.

48. Urban population increased at annual rates of 4.8 per cent in Africa, 4.5 per cent in East Asia, 4.4 per cent in Latin America, 3.8 per cent in South Asia, 3.3 per cent in the Soviet Union, 2.6 per cent in Oceania, 2.3 per cent in Northern America and 1.7 per cent in Europe. Rural population increased at 2.0 per cent in South Asia, 1.9 per cent in Africa, 1.4 per cent in Oceania, 1.2 per cent in Latin America and 0.8 per cent in East Asia. It diminished at 0.2 per cent in the Soviet Union and Northern America, and at 0.4 per cent in Europe. Here it should be noted that the growth of the urban population in Europe, considerable as it was, has been slower than the growth of the rural populations of South Asia and Africa.

TABLE 14. URBAN AND RURAL POPULATION IN 1950 AND 1970 AND AVERAGE ANNUAL RATE OF GROWTH IN BOTH, IN THE WORLD AND EIGHT MAJOR AREAS

	Urban population (millions)		*Rural population (millions)*		*Annual increase, 1950-1970 (percentage)*	
Area	*1950*	*1970*	*1950*	*1970*	*Urban population*	*Rural population*
World total	*691.5*	*1,315.2*	*1,814.4*	*2,305.8*	*3.2*	*1.2*
More developed regions	435.7	692.8	421.7	391.5	2.3	−0.4
Less developed regions	255.9	622.5	1,392.7	1,914.3	4.4	1.6
Africa	28.4	74.7	190.8	277.0	4.8	1.9
Latin America	67.1	161.0	97.0	123.2	4.4	1.2
Northern America	105.7	167.9	60.4	58.5	2.3	−0.2
East Asia	99.1	245.7	574.3	680.6	4.5	0.8
South Asia	108.2	230.9	590.3	880.4	3.8	2.0
Europe	204.0	284.1	187.9	174.9	1.7	−0.4
Oceania	8.1	13.6	4.4	5.8	2.6	0.6
USSR	70.9	137.3	109.2	105.4	3.3	−0.2

TABLE 15. NUMBER OF CITIES HAVING AT LEAST ONE [illegible] POPULATION OF THESE CITIES AND PERCENTAGE OF URBAN POPULATION [illegible] 1950 AND 1970, IN THE WORLD AND EIGHT MAJOR AREAS[a]

Area	Number of "million-cities"		[illegible]		[illegible]	
	1950	1970	[illegible]	[illegible]	[illegible]	[illegible]
World total	75	162	[illegible]	[illegible]	[illegible]	[illegible]
More developed regions	51	83	[illegible]	[illegible]	[illegible]	[illegible]
Less developed regions	24	79	[illegible]	[illegible]	[illegible]	[illegible]
Africa	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Latin America	6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Northern America	14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
East Asia	13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Asia	8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Europe	28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oceania	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
USSR	2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[a] [illegible] conform with the [illegible] [illegible] 1950.

49. Table 15 shows the [illegible] extent to which the world urban population is concentrated in cities with 1 million or more inhabitants ("million-cities"). In 1950 there were altogether 75 such cities, of which 24 were in less developed regions. In 1970 there were 162, of which 79 were in less developed regions. In the interval the combined population of "million-cities" grew from 174 million to [illegible] million; the growth was from [illegible] to 223 million in more developed regions and from [illegible] to 193 million in less developed regions. As a [illegible] [illegible]

TABLE 16. [illegible]

	[illegible]			[illegible]		
	Total population	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
World total						
Growth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Births	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Deaths	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Natural increase	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net transfers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
More developed regions						
Growth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Births	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Deaths	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Natural increase	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net transfers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Less developed regions						
Growth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Births	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Deaths	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Natural increase	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net transfers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[a] [illegible] from the [illegible] [illegible] regions.

regions may have grown by 13.6 million inhabitants, and that of the less developed regions by 18.7 million. In the more developed regions, 6.4 million of the urban growth may have resulted from urban natural increase, and 7.2 million from net rural-to-urban population transfers. In the less developed regions, 9.5 million may represent the year's urban natural increase and 9.2 million the additional urban population gain resulting from rural-to-urban transfers. In both sets of regions, the birth rates as well as the death rates were lower in urban than in rural areas. The rate of natural increase was somewhat lower in urban than in rural areas in the more developed regions, whereas in the less developed regions both the urban and the rural areas had, on average, about the same rates of natural increase. The impact of urbanization on rural population change is obviously greater in the more developed regions, where the rural population is already much reduced, than in the less developed regions where the great majority of the population is still rural.

51. The calculation suggests that, on balance, in 1960, more than 7 million persons moved from rural to urban areas in the more developed regions and more than 9 million in the less developed regions. These figures exaggerate somewhat the volume of net migration, because they include those demographic transfers which have resulted from the reclassification as "urban" of localities previously designated as "rural", concurrent with the geographical expansion of urban settlements. (However, areas about to be reclassified are also often those which have attracted many migrants, bringing their population to an urban level of size or residential density.) Even if generous allowance is made for these effects, it remains evident that the rural-to-urban migratory balances are of far greater magnitude than the balances of international migration or of interregional migration within large countries.

Summary

52. Beginning in the nineteenth century, medical and public health progress was achieved step by step in the economically more advanced regions. Before it had progressed very far birth rates underwent a decline. In those regions, therefore, population growth was never speeded up to such an exceedingly high rate. Now that lower birth rates have prevailed for a number of decades, the proportion of aged persons in the more developed countries has risen and death rates have stopped falling. Currently, the rate of population growth in these regions averages 0.9 per cent.

53. In a few of the less developed countries, most of them small and many of them islands, a marked decrease in birth rates has also begun in the most recent years without, as yet, entailing a decisive birth-rate decline in less developed countries of large population. According to a number of reports, China seems to be the notable exception. Smaller less developed countries of recent birth-rate decline, it is worth pointing out, are often those where, about 20 years previously, declines in death rates had been the most precipitous. This makes it seem reasonable to argue that, perhaps with the lapse of an intervening generation, markedly reduced mortality can elicit in a population the spontaneous response of deliberate fertility regulation. The survival of most children to adulthood and the extent of the economic and social claims made by this much enlarged new generation of adults, after all, demonstrates clearly that large families are no longer necessary for family security. Doubts are expressed, on the other hand, whether this experience, leading to a spontaneous modification of fertility, will occur within the near future also in those countries where population pressures are already severe.

54. The triumph of public health work has depended in large measure upon the willing co-operation of a general public anxious to avoid disease and untimely death. Hence the death rates often responded rapidly to the modern methods of intervention. It remains uncertain whether a rapid decrease in birth rates can be directly provoked by a similar combination of specific technology and organization in the field. Organized efforts to promote the reduction of fertility may often meet with much public reluctance or motivational conflict unless other concrete things also happen to change a people's outlook in these respects. The implication may even be that in some regions population growth still has to accelerate before it can be effectively slowed down. But already the rate of population growth in the less developed regions has risen to the level of 2.4 per cent per annum. With further progress in public health still to be made, with the inevitable long persistence of population age structures favouring high birth rates and low death rates, and with significant fertility reduction perhaps still slow in coming about, a high population growth rate will probably persist for many future decades in several populous regions of the world.

55. Since 1950, the accelerated population growth has raised many a challenge with which the peoples and Governments of less developed countries have coped more or less adequately. It is certain that agricultural productivity in the world as a whole has increased, whether per farm worker or per unit of cultivable land, though very unevenly among the world's regions and countries and perhaps not at all in some areas. At least during the 1950s, if not more recently, additional lands have been taken into agricultural production so that the density of occupation of cultivated lands, in a majority of the regions, was no greater in 1970 than in 1950.

56. Health and education have certainly improved remarkably in most of the world, though probably not always at the rates that might have been desired. But insufficient growth of income, the overcrowding of lands and living quarters and excessive urban congestion have come into evidence among the consequences of population growth in many parts of the world.

57. The less developed regions are those where a large proportion of the population, often two thirds if not more, still gain their sustenance directly from agriculture. However, a rapid shift is taking place and increasing proportions of the population seek their livelihood in other activities. The consequent enormous urbanization, with all its woes, is an inevitable phase in the transition towards a more diversified and more prosperous society, though there is frequent cause to question whether, in countries of small capital resources, the economic and social wall-being of the new job-seekers can be noticeably improved.

58. This economic and social transition is attended [illegible] growing number of very big cities which attain sizes that have never been known in the past. Problems affecting the quality of the physical environment have emerged, of a kind and on a scale of which there is little historical experience. Notwithstanding the fast growth of cities, large increases in rural population continue to be observed.

59. The economic, social and ecological implications to which reference is made have many dimensions, including the technological, organizational, political, administrative, financial, educational, cultural and so forth. Within this complex matrix of development factors, the size, growth and composition of the population, and of various segments of the population, also have a determining influence. An increasing proportion of the world population is that which is concentrated in South Asia, although there is little room for expansion South Asia also contains a large share of the rural and the agricultural population of the world. By contrast, in various parts of Africa and Latin America, there remains apparently much room for expansion. It is evident that adversities arising from rapid population increases are not of the same kind and intensity in different parts of the world. In some sparsely settled countries, it can be argued that population increase diminishes various overhead costs and therefore contributes to a more substantial development. In all circumstances, however, the plans, policies and programmes directed towards the improvement of economic, social and ecological conditions will have to take many detailed aspects of population trends into account. The increase in awareness of the new magnitudes of population change should suffice to ensure that the demographic component of developmental problems shall not be neglected.

WORLD AND REGIONAL POPULATION PROSPECTS*

*United Nations Secretariat***

1. In this era of planning for social and economic development, it is increasingly realized that demographic measures are among key factors in the planning process. The future size, structure and distribution of population are essential for any plan that involves food, housing, employment, education, health or other public services. This is also an era of increasing awareness—of man's unprecedented growth, of the interaction between this growth and the environment, and of the possible implications for the future. Investigations into these complex relationships have added to the demand for population projections.

2. This explains the vast increase in the number of projections prepared, particularly since the middle of this century. Understandably, there were, and still are, many less developed countries where the basic data needed are deficient or even non-existent. Therefore, the United Nations and other international bodies have an important role in this process, namely, to estimate the basic demographic measures and prepare the projections.

3. Thus, projections of total population by sex and age have been prepared frequently by the United Nations Secretariat during the past two decades. [1] The Secretariat has also prepared projections of urban and rural populations [2] and, more recently, projections of households and families. [3] The present paper is based on the most recent results of these projections, namely, those assessed in 1973. Before proceeding to a discussion of the projections, the reader is reminded that the results are not predictions (since the future trends of birth and death rates and migratory movements cannot be predicted with certainty), but rather an assessment of possible prospects as seen in the light of information now available. The reader is also reminded that while all projections prepared by countries with reliable statistics are incorporated in the United Nations projections, and while the projections are produced in collaboration with several regional institutions, including the regional economic commissions of the United Nations and the regional demographic training and research centres, the fact remains that in several countries adequate information is not yet available and the projections for these countries are actually based on models.

PROSPECTS OF TOTAL POPULATION AND ITS SEX-AGE COMPONENTS

An overview

4. All available evidence indicates that the remaining period until the end of the twentieth century, short as it is, will make demographic history. During these years, the rate of population growth for the world is expected to reach a peak which may never be experienced again. This record rate of growth, which may be about 2 per cent per annum between 1970 and 1985 for the world as a whole, is expected to maintain for another 15 years its current value of 2.4 per cent in the less developed regions combined [4] with much higher rates in some of the major areas, such as South Asia, Latin America and Africa. In the more developed regions, on the other hand, the annual rate of growth is expected to remain below 1 per cent. Consequently, the world population may increase by 77 per cent between 1970 and 2000, from about 3.6 thousand million to about 6.4 thousand million. The expected increase may be virtually 100 per cent in the less developed regions (from approximately 2.5 thousand million to 5 thousand million) and may be only 26 per cent in the more developed regions (from 1.1 thousand million to 1.4 thousand million).

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** Population Division of the Department of Economic and Social Affairs.

[1] "The past and future growth of world population—a long range view", *Population Bulletin No. 1* (United Nations publication, Sales No. 52.XIII.2); "Framework for future population estimates, 1950-1980, by world regions", *Proceedings of the World Population Conference, 1954*, vol. III (United Nations publication, Sales No. 55.XIII.8), pp. 283-328; *The Future Growth of World Population* (United Nations publication, Sales No. 58.XIII.2); *World Population Prospects as Assessed in 1963* (United Nations publication, Sales No. 66.XIII.2), *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4).

[2] *Growth of the World's Urban and Rural Population, 1920-2000* (United Nations publication, Sales No. E.69.XIII.3); "Estimates of urban and rural population by regions and countries, 1960-1985", *Monthly Bulletin of Statistics*, vol. XXV, No. 11, pp. xxiv-xlv (Statistical Office of the United Nations, November 1971).

[3] "Projection of the number of households and families, 1965-1985" (ESA/P/WP.35).

[4] For the purpose of this study, the less developed regions consist of Africa, Asia (excluding Japan), South and Central America (excluding Temperate South America), and the Pacific Islands of Melanesia, Polynesia and Micronesia.

5. Both in fertility and in mortality major changes are anticipated only in the less developed regions. In these regions, taken as a whole, fertility decline is expected to begin by the middle or end of the decade of the 1970s and to be such that the general level would be reduced by about 30 per cent in 25 years. There will naturally be considerable variation among the major areas, with the anticipated decline being faster in East Asia while in Africa the decline would begin a decade later.

6. A considerable decline in mortality levels is anticipated in the less developed regions. An over-all gain of more than 10 years in life expectancy at birth is anticipated before the turn of the century, and the death rate may decline from about 14 to 8 or 9 per 1,000 towards the end of the century. Part of this decline, however, is contributed by the young age structure of the population of these countries Again, there are considerable differences among the major areas, with Africa lagging behind, and with some regions attaining a level of death rate of 5 or 6, which probably has not been experienced before in sizable human societies and which, because of the anticipated aging process, may not be experienced again in the foreseeable future.

7. In addition to population size, rate of growth and components of growth, the age structure is also of crucial importance in view of its social, economic and demographic implications This is why great importance is given to the study of anticipated future changes in the age distribution which is now very unfavourable in the less developed regions as they have a very high percentage of children below 15 years (41 as against 27 in the more developed regions) and a low percentage in the working ages 15-64 years (56 as against 64). Though the anticipated fertility decline in the less developed regions could improve the current age stucture, it appears that in these regions part of the decline in the proportion of children will be offset by mortality decline until the middle of the decade of the 1980s, after which time the effect of the faster decline in fertility on the age structure is expected to become more obvious Thus, by the turn of the century, the less developed regions as a whole may have a proportion of 36 per cent children and 59 per cent in the working ages. On the other hand, the main change anticipated in the age structure of the more developed regions is its continuous aging

8. Particular attention needs to be drawn to the projected demographic situation in Africa where the anticipated delay in the onset of fertility decline implies that its current rate of population growth of 2 7 per cent may continue to increase to 3 per cent per annum, with only little decline anticipated before the end of the century It also implies that Africa may continue to have the world's highest rate of growth well into the next century The delay also means that Africa may be the only major area where the current highly unfavourable age structure for economic and social development may have an adverse change within the near future, with the percentage of children slightly increasing to 45 and the percentage in the working ages slightly decreasing to 52 by the mid-1980s Actually the figures presented later in this paper show that the age structure of Africa by the year 2000 may not show any appreciable change over that of 1970.

Total population growth

9. Recent years have seen a dramatic change in the world's demographic situation. Many of the less developed regions have, during the past two decades, experienced a remarkable decline in their mortality levels, which has brought about an accelerated rate of growth never experienced before in the history of the world's population and which may never be experienced again in the foreseeable future after the next two decades Thus, the total world population, which was increasing at an average annual rate of only about 0 5 per cent throughout the nineteenth century, and 0.8 per cent in the first half of the twentieth century, was suddenly increasing during the decade of the 1950s at the rate of 1.8 per cent per annum. The rate of growth of the world population rose still slightly higher during the 1960s and is currently estimated at about 1.9 per cent per annum

10. According to the "medium" variant of the projections,[5] the total world population may continue to grow at a virtually constant rate of about 2 per cent per annum until 1985 (see table 1) A downward trend would then begin, ending with a value of 1 7 per cent in the year 2000.

11. The current acceleration in the rate of growth is confined mainly to the less developed regions, which, according to the medium projections, may continue to gain about 2.4 per cent per annum in their population until the mid-1980s. Then a gradual decline would begin, bringing the growth rate down to 2.1 or 2 0 per cent towards the end of the century. The more developed regions, which already have a low mortality level, and in which a further slow decline in fertility is anticipated during the remainder of this century, are expected to have a slow but sustained decline in their rate of growth If the assumptions of the medium variant projections turn out to be true, the population

quinquennia, becoming 1,365 million in the year 2000 The corresponding five-year average increase in the less developed regions is 13 per cent up to 1985, which would then decrease to 11 per cent in the last quinquennium of the century. Accordingly, the total population in these regions would increase from 2,55[illegible] million in 1970 to 5,0[illegible] at the end of the century.

[5] The projections of the less developed regions were prepared in four variants "medium", "low", "high", and "constant fertility". The fourth variant, though [illegible], was intended to illustrate the demographic effects of [illegible] remaining constant at its initial level in the year 19[illegible]

TABLE 1. TOTAL WORLD POPULATION AND ANNUAL RATES OF GROWTH, BY AREAS AND REGIONS, 1970-2000

(Medium variant)

Area and region	Population (millions)							Annual rate of growth (percentage)					
	1970	1975	1980	1985	1990	1995	2000	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
World total	3,621	3,988	4,401	4,858	5,346	5,866	6,407	1.9	2.0	2.0	1.9	1.9	1.8
More developed regions	1,084	1,133	1,183	1,234	1,282	1,326	1,368	0.9	0.9	0.9	0.8	0.7	0.6
Less developed regions	2,537	2,855	3,218	3,624	4,064	4,540	5,039	2.4	2.4	2.4	2.3	2.2	2.1
Africa	352	402	462	536	622	721	834	2.7	2.8	2.9	3.0	3.0	2.9
Eastern Africa	100	114	132	154	180	211	246	2.7	2.9	3.1	3.1	3.2	3.1
Middle Africa	40	45	51	58	67	77	89	2.4	2.5	2.7	2.7	2.8	2.8
Northern Africa	86	99	114	133	154	177	202	2.8	2.9	3.0	3.0	2.9	2.7
Southern Africa	24	28	32	37	42	49	56	2.7	2.9	2.9	2.8	2.8	2.7
Western Africa	101	116	133	154	179	208	241	2.6	2.8	2.9	3.0	3.0	3.0
Latin America	284	326	374	428	489	555	625	2.7	2.8	2.7	2.7	2.5	2.4
Caribbean	26	28	32	36	40	44	49	2.1	2.2	2.2	2.2	2.1	2.0
Middle America	67	79	93	109	128	149	173	3.2	3.3	3.3	3.2	3.1	2.9
Temperate South America*	36	39	42	45	48	50	53	1.4	1.4	1.3	1.2	1.1	1.0
Tropical South America	155	180	207	239	274	311	351	2.9	2.9	2.8	2.7	2.6	2.4
Northern America*	226	237	249	262	275	286	296	0.9	1.0	1.1	1.0	0.8	0.7
East Asia	926	1,005	1,087	1,165	1,235	1,304	1,373	1.6	1.6	1.4	1.2	1.1	1.0
China	772	838	907	974	1,033	1,093	1,152	1.6	1.6	1.4	1.2	1.1	1.0
Japan*	104	111	118	122	126	130	133	1.3	1.1	0.8	0.6	0.5	0.5
Other East Asia	50	56	62	69	75	82	88	2.2	2.1	2.1	1.9	1.7	1.5
South Asia	1,111	1,268	1,449	1,656	1,885	2,131	2,384	2.6	2.7	2.7	2.6	2.5	2.2
Eastern South Asia	285	326	374	430	490	553	617	2.7	2.8	2.8	2.6	2.4	2.2
Middle South Asia	749	853	971	1,105	1,255	1,417	1,584	2.6	2.6	2.6	2.5	2.4	2.2
Western South Asia	77	90	104	121	140	161	183	3.0	3.0	3.0	2.9	2.8	2.6
Europe*	459	474	488	502	515	528	540	0.6	0.6	0.6	0.5	0.5	0.5
Eastern Europe*	103	106	110	113	116	119	122	0.6	0.6	0.6	0.5	0.5	0.5
Northern Europe*	80	82	84	86	88	89	91	0.4	0.4	0.4	0.5	0.4	0.4
Southern Europe*	128	132	137	142	147	151	156	0.7	0.7	0.7	0.7	0.6	0.6
Western Europe*	148	153	157	161	165	168	171	0.7	0.5	0.6	0.4	0.4	0.3
Oceania	19	21	24	26	28	31	33	2.0	2.0	1.9	1.8	1.6	1.6
Australia and New Zealand*	15	17	18	20	22	23	25	1.8	1.8	1.7	1.5	1.3	1.2
Melanesia	3	3	4	4	5	5	6	2.6	2.7	2.8	2.8	2.8	2.7
Micronesia and Polynesia	1	1	2	2	2	2	3	2.6	2.6	2.4	2.3	2.1	1.9
USSR*	243	255	269	283	297	309	321	1.0	1.0	1.1	1.0	0.8	0.8

SOURCE: Estimated by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.
Note: Regions marked with an asterisk are those considered "more developed".

12. The differential increase can be summarized as follows. According to the medium variant, between 1970 and 2000 the world population would increase by 77 per cent, the more developed regions would add 26 per cent to their population, and in the less developed regions the increase would be as much as 99 per cent As a result of these different rates of growth, the projected population of the less developed regions at the end of the century would be more than three and a half times the projected total for the more developed regions (3.7 to 1), while in 1970 it was a *little less than two and a half times as large (2 3 to 1)*

13 According to the "low" and "high" variants, the range within which the population of the less developed regions would probably fall by the end of the century is from 4,685 million to 5,367 million The high variant implies population growth at a rate of about 2.5 or 2.6 per cent per annum until 1990, followed by a *gradual decline in the annual rate to 2.4 per cent at the* end of the century. The low variant foresees a more moderate rate of population growth which would gradually decrease from 2 3 to 1 7 per cent by the end of the century. In the "constant fertility" variant, in which fertility is assumed to remain constant at the 1970 level throughout the rest of the century, the rates of growth indicate that if the populations of the less developed regions maintained their 1970 levels of fertility they would have an accelerated increase in their annual rates of growth from 2 4 in 1970-1975 to 3 0 in 1995-2000, and their total population would accordingly reach 5,798 million by the end of the century.

14. For the total population of the world in the year 2000, the projections give the following estimates: 6,047 million according to the medium variant, and 5,999 million, 6,803 million and 7,200 million according to the low, high and constant fertility variants, respectively. The corresponding annual rates of growth in the last quinquennium of the century are 1.8 for the medium variant, and 1.4, 2.1 and 2 6 for the low, high and constant fertility variants, respectively.

15 Among the world's major areas the largest addition to the population during the projection period is expected in South Asia, which currently contains almost one third of the world population. As the data in table 1 show, the population of this major area is anticipated to increase from 1,111 million in 1970 to 2,834 million in the year 2000 according to the medium variant, and it may still reach 2,529 million if the assumptions of the high variant materialize. The next major area of importance with respect to gain in population is East Asia where, although the pace of growth is expected to be moderate (from 1 6 in the beginning of the projections period to 1.0 in the end, according to the medium variant), the absolute increase will be very large, from 926 million to 1,373 million. Sizable increases in total population are also expected in Latin America and Africa during the same period. According to the medium variant, the increase in Latin America would be from 284 million in 1970 to 625 million in 2000. In Africa the corresponding increase is from 352 million to 834 milliot It is also to be noted that for the year 2000 th "constant fertility" estimate of total population is highe than the medium estimate by 14 per cent in South Asi 22 per cent in East Asia (excluding Japan), 16 per cer in Latin America and 6 per cent in Africa, showing th effect of expected fertility decline on the population c various major areas.

16. Rates of growth are currently highest in Lati America Latin America is expected to maintain unt [illegible]

the rate would gradually decrease to 2.4 per cent at th end of the century In South Asia, where current hig growth rates are influenced by very high fertility level *a gradual decrease is expected, from 2 6 per cent aroun 1970 to 2 2 per cent around 2000 In contrast to th* expected pattern of constant and then declining growt rates in the other less developed regions, Africa i expected to show a clearly rising growth rate durin most of the period The annual population growth rat in this major area, which was estimated at 2 7 per cer during 1970-1975, may rise to about 3 0 per cent b 1985, at which time the rate would be significantly highe than in any other major area It is only in the last quin quennium of the century, according to the medium pro *jections, that a slight decline in the growth rate to 2.9 pe* cent per annum is anticipated (see table 1).

Projected trends in fertility and mortality

17. In general, the trends in demographic rates diffe greatly from the less developed to the more develope regions. For the more developed regions, trends hav been established in fertility and mortality so that although minor fluctuations are to be expected, there i no reason to anticipate radical changes during the nex several decades, barring unforeseen changes whicl *would result from wars or serious changes in govern* ment policies. For many of the less developed regions however, this is a time of great change: relatively rapi decline of mortality and consequent high growth rates and also some changes in age structure. (See table 2 fo crude birth and death rates implied in the projection and table 3 for the assumed gross reproduction rates[6] and life expectancies at birth.) For the world as a whol the assumptions imply a decline between 1970-1975 an 1995-2000 of about 17 per cent in the birth rate, fro 32 to 26 per 1,000, and about [illegible] per cent in the deat *rate, from 13 to 9 per 1,000.*

Fertility

18 The birth rate in the more developed [illegible] as a whole may have a small net decline from [illegible] 15.7 per 1,000 during the whole period. On the [illegible]

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[6] The gross [illegible] is the [illegible] daughters that a [illegible] fertility schedule, [illegible]

TABLE 2. CRUDE BIRTH AND DEATH RATES, BY AREAS AND REGIONS, 1970-2000

(Medium variant; rates per 1,000 population)

Area and region	Crude birth rates 1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	Crude death rates 1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
World total	31.8	31.4	30.6	29.3	28.0	26.4	12.7	11.8	11.0	10.2	9.5	8.8
More developed regions	17.2	17.5	17.6	17.0	16.2	15.7	9.2	9.4	9.6	9.7	9.8	9.9
Less developed regions	37.9	36.7	35.2	33.3	31.6	29.4	14.2	12.7	11.4	10.4	9.4	8.6
Africa	46.5	46.0	45.4	44.1	42.4	40.1	19.9	17.8	16.0	14.3	12.7	11.3
Eastern Africa	47.8	47.3	46.9	45.9	44.3	42.1	20.8	18.3	16.3	14.5	12.9	11.4
Middle Africa	45.4	44.6	44.5	43.5	42.4	40.9	21.8	19.8	18.0	16.2	14.5	13.0
Northern Africa	44.0	43.1	42.2	40.8	38.5	35.4	16.0	14.2	12.7	11.3	10.1	8.9
Southern Africa	43.1	43.3	41.4	38.9	37.6	36.2	16.2	14.5	12.8	11.3	10.0	9.0
Western Africa	48.5	48.4	47.9	46.7	45.0	42.8	22.6	20.5	18.6	16.8	14.9	13.1
Latin America	37.0	36.1	34.9	33.4	31.6	29.7	9.2	8.3	7.4	6.7	6.1	5.6
Caribbean	34.2	32.8	31.8	30.6	29.1	27.4	9.4	8.6	7.9	7.3	6.8	6.4
Middle America	42.2	41.6	40.8	39.1	36.9	34.8	9.4	8.3	7.4	6.6	6.0	5.4
Temperate South America	22.8	22.1	21.4	20.5	19.4	18.2	8.6	8.5	8.4	8.5	8.5	8.6
Tropical South America	38.3	37.1	35.4	33.6	31.5	29.3	9.2	8.2	7.2	6.4	5.7	5.2
Northern America	16.5	17.5	18.4	17.6	15.9	15.1	9.3	9.5	9.6	9.6	9.7	9.8
East Asia	26.0	24.7	22.4	19.6	18.7	18.0	9.8	9.0	8.4	8.0	7.8	7.7
China	26.7	25.3	22.9	19.9	18.9	18.2	10.2	9.4	8.6	8.1	7.8	7.6
Japan	19.2	18.0	15.4	14.0	13.9	14.5	6.6	6.8	7.3	7.9	8.6	9.4
Other East Asia	30.2	28.8	27.9	26.0	23.2	20.9	8.7	7.9	7.3	6.8	6.5	6.3
South Asia	42.8	41.1	39.4	37.2	34.6	31.3	16.5	14.5	12.8	11.4	10.1	8.9
Eastern South Asia	43.1	41.8	40.2	37.3	34.1	30.5	16.2	14.3	12.6	11.1	9.8	8.6
Middle South Asia	42.7	40.7	38.9	37.0	34.6	31.4	16.8	14.8	13.0	11.6	10.3	9.1
Western South Asia	43.1	42.3	41.1	39.3	36.9	33.5	14.2	12.8	11.5	10.3	9.1	8.1
Europe	16.1	16.1	16.1	16.1	15.7	15.3	10.4	10.6	10.8	10.7	10.6	10.5
Eastern Europe	16.6	16.9	16.4	15.7	15.3	15.3	10.2	10.5	10.7	10.6	10.4	10.1
Northern Europe	15.9	16.1	16.1	16.4	16.2	15.9	11.2	11.4	11.5	11.5	11.3	11.0
Southern Europe	17.6	17.3	17.2	17.1	16.8	16.2	9.3	9.5	9.8	10.1	10.2	10.2
Western Europe	14.6	14.4	15.0	15.2	14.7	14.1	11.1	11.2	11.1	11.0	10.8	10.6
Oceania	25.1	25.4	25.0	24.1	23.1	22.2	9.4	9.0	8.7	8.5	8.2	8.0
Australia and New Zealand	21.2	21.6	21.2	20.2	19.2	18.7	8.1	8.0	7.9	8.0	8.0	8.0
Melanesia	42.4	42.2	41.1	40.3	38.1	35.3	16.8	15.1	13.5	11.9	10.3	8.9
Micronesia and Polynesia	34.0	32.5	30.6	28.7	26.8	24.2	7.6	6.8	6.3	5.9	5.6	5.4
USSR	17.8	18.7	19.5	18.9	17.6	16.9	7.9	8.4	8.9	9.3	9.4	9.4

SOURCE: Estimated by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat.

hand for the less developed regions as a group, the birth rate may undergo more substantial decrease, from 38 to 29 per 1,000 between the beginning and the end of the projection period according to the medium variant, with the decline anticipated to gain momentum only after the year 1980 (table 2). The birth rates of the less developed regions at the end of the century range from 26 per 1,000 in the low variant to 32 in the high variant.

19. A look at the regional fertility data in Europe (table 3) shows that the assumed trends in the gross reproduction rate are not identical, but the changes are so small that there is a risk involved in trying to identify these different patterns. For Europe as a whole, the gross reproduction rate of 1.11 in 1970-1975 is assumed to decline to 1.08 in 1975-1980 and to maintain this level until the end of the century. In Western Europe, the level maintained from 1985 onward is actually that of replacement. The pattern assumed for Northern America is virtually identical to that of Western Europe. A slightly decreasing pattern is assumed in Japan, with replacement level again assumed to be reached around 1985. A very slightly increasing trend is assumed in the Union of Soviet Socialist Republics, from 1.18 at first to 1.22 in 1985-1990, followed by a very slight decline to 1.20, which would still be substantially higher than

TABLE 3. GROSS REPRODUCTION RATES AND LIFE EXPECTANCY AT BIRTH, BY AREAS AND REGIONS, 1970-2000

(Medium variant)

Area and region	Gross reproduction rates						Life expectancies at birth (both sexes combined)					
	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
World total	2.15	2.09	2.02	1.93	1.84	1.72	58.9	60.5	62.0	63.4	64.8	66.1
More developed regions	1.13	1.10	1.11	1.11	1.10	1.10	71.2	71.8	72.3	72.7	73.1	73.5
Less developed regions	2.60	2.50	2.37	2.20	2.06	1.89	53.9	56.2	58.4	60.4	62.3	64.0
Africa	3.11	3.10	3.06	2.98	2.85	2.65	45.2	47.7	50.3	52.7	55.1	57.4
Eastern Africa	3.19	3.20	3.17	3.09	2.97	2.78	44.5	47.2	49.8	52.3	54.7	57.0
Middle Africa	2.92	2.92	2.94	2.89	2.82	2.70	42.0	44.5	47.0	49.5	52.0	54.5
Northern Africa	3.07	3.00	2.91	2.79	2.60	2.36	50.5	53.0	55.5	57.8	60.0	62.0
Southern Africa	2.76	2.76	2.71	2.63	2.51	2.34	50.7	53.2	55.6	57.9	60.0	62.0
Western Africa	3.25	3.24	3.22	3.15	3.03	2.84	41.3	43.8	46.3	48.8	51.3	53.8
Latin America	2.57	2.45	2.32	2.18	2.04	1.90	61.9	64.0	65.9	67.6	69.4	70.6
Caribbean	2.37	2.21	2.05	1.93	1.81	1.70	64.0	65.6	67.0	68.2	69.3	70.3
Middle America	3.11	3.00	2.88	2.70	2.51	2.33	61.7	64.0	65.7	67.3	68.6	69.9
Temperate South America	1.50	1.43	1.36	1.30	1.24	1.18	67.3	68.8	69.8	70.5	71.2	71.7
Tropical South America	2.63	2.48	2.32	2.16	2.00	1.84	60.6	62.8	65.0	67.1	69.0	70.8
Northern America	1.07	0.99	1.02	1.04	1.04	1.04	71.4	71.7	72.0	72.2	72.4	72.5
East Asia	1.75	1.59	1.39	1.21	1.15	1.10	62.9	65.0	66.9	68.5	70.0	71.2
China	1.84	1.64	1.42	1.21	1.15	1.10	61.6	63.8	66.0	67.8	69.5	70.8
Japan	1.05	1.06	1.04	1.02	1.02	1.01	73.3	74.3	74.6	74.7	74.8	74.8
Other East Asia	2.09	1.85	1.66	1.50	1.37	1.27	61.3	63.4	65.3	67.1	68.6	70.0
South Asia	2.99	2.91	2.79	2.60	2.38	2.09	49.5	52.0	54.5	56.8	59.1	61.2
Eastern South Asia	2.98	2.92	2.80	2.57	2.29	1.98	49.9	52.5	54.9	57.3	59.6	61.6
Middle South Asia	2.98	2.89	2.77	2.60	2.39	2.11	48.8	51.3	53.8	56.2	58.5	60.6
Western South Asia	3.08	3.02	2.92	2.77	2.55	2.24	54.4	56.7	58.8	60.8	62.6	64.3
Europe	1.11	1.08	1.08	1.08	1.08	1.08	71.3	72.0	72.6	73.2	73.7	74.1
Eastern Europe	1.07	1.05	1.05	1.06	1.07	1.08	69.9	70.7	71.4	72.2	72.9	73.6
Northern Europe	1.14	1.12	1.10	1.11	1.10	1.10	72.5	73.0	73.5	74.0	74.3	74.6
Southern Europe	1.21	1.18	1.17	1.16	1.15	1.14	70.9	71.6	72.1	72.6	72.9	73.3
Western Europe	1.04	0.99	1.00	1.02	1.02	1.02	71.8	72.5	73.2	73.9	74.4	74.9
Oceania	1.68	1.65	1.61	1.57	1.51	1.44	68.3	69.0	69.6	70.0	70.8	71.4
Australia and New Zealand	1.40	1.37	1.34	1.30	1.26	1.23	72.3	72.7	73.1	73.4	73.7	73.9
Melanesia	3.03	3.02	2.92	2.83	2.64	2.39	48.4	51.0	53.5	56.0	58.6	61.3
Micronesia and Polynesia	2.24	2.05	1.89	1.75	1.61	1.45	64.0	65.8	67.2	68.5	69.7	70.8
USSR	1.18	1.19	1.21	1.22	1.21	1.20	70.4	70.9	71.5	72.0	72.5	73.0

SOURCE: Estimated by the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat

in Europe or Northern America. The assumptions for Temperate South America and also for Australia and New Zealand, where current fertility levels are relatively high, indicate continuous and sizable declines during the rest of this century.

20. Significant differences in probable fertility trends are also evident among the major areas constituting the less developed regions. Fertility, as measured by the gross reproduction rate, is likely to remain relatively unchanged, according to the medium variant, in Africa taken as a whole up to 1980-1985, but it is anticipated that its gross reproduction rate of 3.1 may fall to 2.7 by 1995-2000, which is the fertility level of South Asia around 1985. It is also to be noted that significant declines in African fertility are expected mainly in Northern Africa and Southern Africa, where the gross reproduction rate would decrease according to the medium assumption, from 3.1 to 2.4 in the former and from 2.8 to 2.3 in the latter. The assumptions themselves indicate that the speed of fertility decline in Africa later on in this century is questionable; the low variant gives a gross reproduction rate of 2.2 for 1995-2000, while the high variant gives 2.9, with the difference between the two variants becoming obvious only after 1985.

21. Fairly sizable decreases in fertility are foreseen for East Asia and South Asia. In East Asia, the gross reproduction rate is assumed to fall from the current level of 1.8 to 1.1 in 1995-2000, and in South Asia, from 3.0 to 2.1 during the same period. The existence of family planning programmes in a number of countries, and the fact that fertility decline has already begun in certain other countries in these regions, have been taken into consideration in the assumptions.

22. In Latin America, a moderate decline in fertility is foreseen in the projections, bringing the gross reproduction rate down from 2.6 in 1970-1975 to 1.9 in 1995-2000. Substantial declines are assumed in Tropical South America (from 2.6 to 1.8), Middle America (from 3.1 to 2.3) and the Caribbean (from 2.4 to 1.7).

Mortality

23. All variants of the projections for the less developed regions anticipate substantial mortality decline and lead to terminal values for the death rate between 9.3 per 1,000 in the case of the low variant and 7.9 in the high variant, which indeed are impressive when compared with the original value of 14.2 estimated for 1970-1975. If the results of the "medium" projections turn out to be true, the crude death rates of both the more developed and the less developed regions would be equal around 1990, due, of course, to the younger age structure of the population of the less developed regions. The slight increase over the projection period shown in the crude death rate of the more developed regions from 9.2 to 9.9 is entirely due to the continued aging of the population, since further mortality improvement is still expected during this period.

24. The life expectancy at birth in the more developed regions as a whole is anticipated to increase by about three more years during the whole period covered by the projections, from 71.2 years in 1970-1975 to 73.5 years in 1995-2000 (table 3). The trend, which consists in very slow and diminishing gains, is very similar in all the more developed regions.

25. Substantial declines in the mortality level are foreseen for the less developed regions. There, the life expectancy, which is estimated at 54 years in 1970-1975, may increase by about 10 years by 1995-2000 according to the medium variant (table 3). Thus, the gap of almost 20 years of life expectancy at birth, which existed between the more developed and the less developed regions at the beginning of the projection period, may be cut in half by the end of the century.

26. All major areas are expected to share in this substantial mortality decline. The medium variant projections assume that between 1970-1975 and 1995-2000, Latin America would gain 8.7 years of life, from 61.9 years to 70.6; East Asia 8.3 years, from 62.9 to 71.2; South Asia 11.7 years, from 49.5 to 61.2; and Africa, where the initial mortality level was the highest, would gain 12.2 years, from 45.2 to 57.4.

27. The combined effect of low mortality and young age distribution is clearly shown by the crude death rates implied in the projections of the less developed regions. As table 2 indicates, some regions, particularly in Latin America, may reach, in the decade of the 1980s, death rates of 7 or less per 1,000; and towards the end of the century, death rates in the range of 5-7 may well be frequent in some less developed regions.

Projected changes in age structure

28. Not only changes in total population size, but changes in the age structure have important implications in planning for economic and social development. The striking contrast between the age structure of the population in the more developed and less developed regions is seen in table 4, as well as in figure I. Whereas in 1970, children under 15 years of age constituted 26.7

TABLE 4. PERCENTAGE DISTRIBUTION OF POPULATION BY MAJOR AGE GROUPS FOR AREAS, 1970, 1985 AND 2000

(*Medium variant*)

	1970	*1985*	*2000*
World			
Total	100.0	100.0	100.0
0-4	13.5	13.3	11.8
5-14	22.9	22.4	21.6
15-64	58.1	58.6	60.4
65+	5.5	5.7	6.2
More developed regions			
Total	100.0	100.0	100.0
0-4	8.5	8.4	7.6
5-14	18.2	15.5	15.2
15-64	63.7	65.3	64.8
65+	9.6	10.8	12.3
Less developed regions			
Total	100.0	100.0	100.0
0-4	15.6	14.9	13.0
5-14	24.9	24.7	23.3
15-64	55.7	56.3	59.2
65+	3.8	4.0	4.5
Africa			
Total	100.0	100.0	100.0
0-4	17.7	18.1	16.8
5-14	26.7	26.7	27.0
15-64	52.7	52.3	52.9
65+	3.0	2.9	3.2
Latin America			
Total	100.0	100.0	100.0
0-4	16.3	15.4	13.5
5-14	26.5	25.3	24.0
15-64	53.5	55.2	58.0
65+	3.7	4.0	4.5
Northern America			
Total	100.0	100.0	100.0
0-4	8.4	8.8	7.3
5-14	20.0	15.3	15.4
15-64	61.9	65.0	66.4
65+	9.7	10.8	10.8
East Asia			
Total	100.0	100.0	100.0
0-4	11.9	10.3	8.5
5-14	21.7	20.2	16.5
15-64	60.9	63.1	67.1
65+	5.4	6.4	7.9

TABLE 4 (*continued*)

	1970	1985	2000
South Asia			
Total	100 0	100 0	100 0
0-4	17.0	16 3	13 7
5-14	25 7	26.4	25 0
15-64	54 2	54 1	57.7
65+	3.1	3.2	3 7
Europe			
Total	100 0	100 0	100 0
0-4	8 3	7 8	7.4
5-14	16 6	14 7	14 7
15-64	63.7	65 4	64.4
65+	11.4	12 1	13 5
Oceania			
Total	100 0	100 0	100 0
0-4	11 1	11.5	10 4
5-14	21 0	20 2	19.4
15-64	60 6	60 6	62 4
65+	7.3	7 7	7.8
USSR			
Total	100 0	100 0	100 0
0-4	8 4	9 3	8.2
5-14	20 2	15.9	16 4
15-64	63 6	65 2	63 4
65+	7 8	9 6	12 0

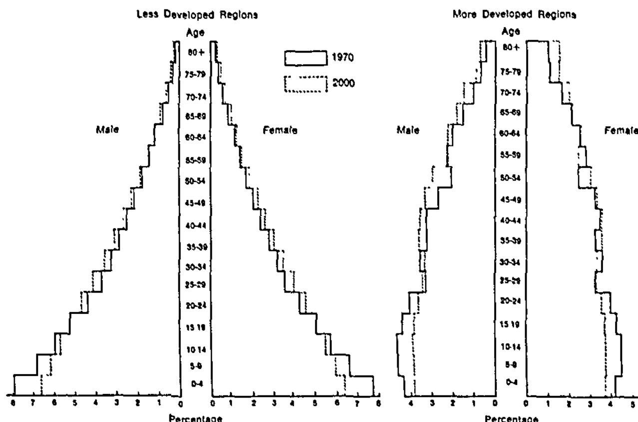
per cent of total population in the more developed regions, they made up 40 5 per cent of the total in the less developed parts of the world in the same year. The more developed regions have an economic advantage over the less developed regions in that, in 1970, 63.7 per cent of their population was of working age, 15-64 years, while the corresponding proportion for the less developed regions was only 55.7 per cent Also distinctly different is the proportion of elderly persons, 65 years of age and over: 9.6 per cent in the more developed regions and only 3 8 per cent in the less developed regions.

29. According to the medium projections, no important change is expected to take place in the age structure of either the more developed or the less developed regions between 1970 and 1985. In the less developed regions, the percentage of children under age 15 may decline slightly, from 40.5 to 39.6, with corresponding slight increases in the other age groups. Whereas assumed declines in fertility cause the proportion of children to decrease, falling mortality, which has its greatest effect in the young ages, tends to offset partially this trend

30 Africa, which currently has the highest proportion of children under age 15 and the lowest proportion

Figure I. Sex/age structure of the population in less developed and more developed regions, 1970 and 2000

(*Medium variant*)



in the working ages, is the only major less developed area where, in the near future, the structural change in population will be unfavourable. That is, the proportion of children is likely to increase (from 44.4 per cent in 1970 to 44.8 per cent in 1985) and the proportion of the population in working age is likely to decrease (from 52.7 to 52.3 per cent). The largest structural change in this period is predicted for East Asia, where the proportion of children in the population may decline from 33.6 to 30.5 per cent, according to the projections. South Asia, despite some decline in fertility, shows the same percentage of children in 1985 as in 1970, namely 42.7.

31. As fertility declines faster, more sizable changes are expected to take place between 1985 and the end of the century. Thus, for the less developed regions as a whole, the medium variant projections imply that during this period the percentage of children under 15 may decrease from 39.6 to 36.3 and the proportion in ages 15-64 may increase from 56.3 to 59.2 per cent. Impressive changes during these last 15 years of the present century are indicated for East Asia, South Asia and Latin America (table 4). It is also to be noted that in none of the major less developed areas, except East Asia, would the proportion of the old-aged population (65 and above) reach 5 per cent within the remainder of this century. As concerns Africa, where some decline in fertility is assumed from 1985 onward, it will be noticed in table 4 that in the year 2000 the projected African age structure is close to that of 1970.

32. In the more developed regions, the percentage of children under 15 is expected to decrease further between 1970 and 2000, from 26.7 to 22.8, while the proportion in the ages of economic activity may remain virtually constant at about 64-65 per cent. On the other hand, the aging of the population, which is a main demographic problem in these regions, is expected to continue. The projected percentage in the age group 65 years and above is rising from 9.6 in 1970 to 10.8 in 1985 and to 12.3 in 2000, according to the projections. Aging of the population is most conspicuous in Europe, where the estimated percentages aged 65 years and over are 11.4 in 1970 and 13.5 in 2000.

33. Though dependency as a socio-economic phenomenon can be measured only when economic activity and other related factors are taken into consideration, some idea about the influence of demographic factors on dependency during the remainder of this century can be obtained from the age structure, as may well be seen from table 5. This table gives the number of dependents, that is, the total of those below 15 years and those aged 65 and above, per 100 persons in the ages of economic activity, namely, 15-64 years. As one would expect, the table shows very little anticipated change in this ratio in the more developed regions, where it declines by three or four points below the initial value of 57 and then stabilizes until the end of the century. The less developed regions, as a whole, have a much higher ratio of about 80, which they would maintain until the more favourable changes in age structure, resulting from the anticipated fertility decline, would lower the ratio to around 69 by the turn of the century.

34. Table 5 also demonstrates some aspects of the regional variation in demographic circumstances in the less developed regions. East Asia already has a low dependency ratio and the projections indicate a sustained and impressive decline. South Asia and Latin America will also show some declines, but even at the end of the century their dependency ratios will be considerably higher than they are now in the more developed regions. These results, of course, reflect the assumptions that were made concerning the trends of fertility and mortality. One additional observation needs to be stressed. If the medium variant assumptions for Africa turn out to be true, mortality decline unaccompanied by fertility decline would worsen the already high dependency ratio and raise it to what may be an unprecedented level. If this should happen, it would take to the end of the century before the dependency ratio, and the entire age structure for that matter, regained its initial value.

Projected changes in functional groups

35. The results discussed in the first section support the common view that world population trends for many

Table 5. Dependency ratios, by area, 1970-2000, medium variant

(Percentage)

	1970	*1975*	*1980*	*1985*	*1990*	*1995*	*2000*
World total	*72*	*72*	*71*	*71*	*70*	*68*	*66*
More developed regions	57	55	54	53	54	55	54
Less developed regions	80	80	79	78	75	72	69
Africa	90	90	90	91	92	91	89
Latin America	87	85	83	81	79	76	72
Northern America	62	55	52	54	56	54	51
East Asia	64	62	61	58	55	51	49
South Asia	84	86	86	85	82	78	73
Europe	57	57	56	53	54	55	55
Oceania	65	64	64	65	65	63	60
USSR	57	53	53	53	56	59	58

years to come will be decisively influenced by trends in the less developed regions The crux of the population problem which will face the world in the coming years lies in the association in many less developed countries of persistent poverty, unemployment, illiteracy, underemployment and technological retardation with rapid growth of numbers of population in these regions Available information also shows how difficult it is to achieve rapid economic development and bring about significant changes in the structure of the population under conditions of rapid population growth.

36. It need not be stressed that virtually all economic, social, cultural and political functions operate in a demographic framework, they are performed by various segments of the population, i e , school age, economically active, women aged 15-44 and so forth Therefore, it is essential to take a closer look into the structural aspects of population growth Though these functional groups are usually defined in terms of more variables in addition to age and sex, a good deal of information can still be obtained from an analysis of the population structure by these two variables only The age groups used here and presented in table 6, namely, 0-4, 5-14, 15-64, and 65 and over, are very informative, since they approximately represent the pre-school age children, the school-age population, the working-age and the old-age population Another important group discussed briefly here is that of females in the reproductive ages 15-44. The importance of demographic factors in planning is evident from the fact that both the size and the growth of these functional groups are determined by the previous age-sex structure of the population and by its experience in fertility, mortality and migration

Working-age population

37. Most noteworthy is the growth anticipated in the working-age population 15-64 years old, with its important implications for employment and capital requirements In the less developed regions, this stratum is expected to increase, according to the medium variant projections, by 111 per cent between the years 1970 and 2000 (table 6). This increase, which amounts to about 1 6 thousand million persons, creates an additional demand for training and employment, which has to be given serious consideration by the planners, together with the problems of the underemployment and unemployment of the existing labour force. On the other hand, the projections indicate that the working-age group would increase by only 28 per cent in the more developed regions within the same period

38. Actually, the percentage increase in the size of this group in the less developed regions is lowered somewhat by the assumed steep decline in fertility in East Asia The projections show that between 1970 and 2000, according to the medium variant, an increase of only 63 per cent in the working-age groups is anticipated in East Asia. During the same period, the increase is as high as 128 per cent in South Asia, 138 per cent in Africa and 138 per cent in Latin America. The last three percentages may reach 133, 142 and 144, respectively, if the high variant assumptions materialize.

39 Limitations of space do not permit undertaking a thorough analysis here of regional differences within each of the major areas It is sufficient to mention that some regions may face very serious manpower problems in the coming years Among these are Northern Africa, where the anticipated increase in population in the working ages is 149 per cent, and Middle America, which may have to cope with the needs of an increase of 181 per cent in its working-age population by the end of the century

40 Considerable variation in the relative increase in the size of this group is also shown by the projections of the more developed regions Thus, while the increase in working population is 65 per cent in Australia and New Zealand, and 40 per cent in Northern America, it is as low as 19 per cent in Europe

School-age population

41. Equally important is the growth of the school-age population between ages 5 and 14 The relative increase in the size of this group in the less developed regions is expected to be somewhat smaller than in the working-age population, except in Africa, due to the fertility decline, which is expected to gain momentum as the end of the century approaches Still, if the medium assumptions turn out to be true, this group would increase by 85 per cent between 1970 and 2000 in the less developed regions (from 633 million in 1970 to 1,173 million in 2000). Again, the needs of the anticipated increase of 540 million in this group will have to be studied carefully, together with the important questions of achieving full enrolment and of improving the quality of the current education It will be noticed in table 6 that in the more developed regions, the expected increase in the size of this group for the medium variant is only 11 million, or 6 per cent.

42 The variation in the relative increase between 1970 and 2000 in this group among the less developed regions is dramatic The medium variant assumptions give a 13 per cent increase in East Asia (excluding Japan); while in South Asia, the increase is 109 per cent and in Latin America (excluding Temperate South America), it is as high as 108 per cent It is in Africa, however, that the mortality decline assumed by the medium variant, accompanied by only a modest decline in fertility, would give rise to an increase of 140 per cent in the school-age population, whose size at the end of the century would thus be more than 2.4 times its size in 1970. Again, the estimated increase of 141 per cent in Middle America should not be taken lightly.

43 Despite the assumed convergence of both the fertility and mortality levels in the more developed regions, the differences in the estimated relative increase in the size of the school-age population are notable and naturally reflect the influence of the initial age-sex structure and the trends of fertili[illegible] [illegible] mortality According to table 6, the [illegible] [illegible]cent in the

TABLE 6. POPULATION, PERCENTAGE INCREASE AND AVERAGE ANNUAL RATE OF GROWTH BY FUNCTIONAL AGE GROUPS FOR AREAS, 1970-2000

(Medium variant)

Area	Population (millions) 1970	1985	2000	Percentage increase 1970-1985	1985-2000	1970-2000	Average annual rate of growth (percentage) 1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
Pre-school children aged 0-4												
World	488	644	759	32.0	17.7	55.4	1.9	1.9	1.7	1.3	1.2	0.8
More developed regions	92	104	104	13.0	0.1	13.1	0.2	1.3	1.0	0.2	—0.3	0.1
Less developed regions	396	540	655	36.4	21.2	65.3	2.3	2.1	1.8	1.4	1.4	1.0
Africa	62	97	140	56.3	44.5	125.9	3.0	2.9	3.0	2.7	2.5	2.1
Latin America	46	66	85	42.4	27.8	82.0	2.3	2.5	2.3	2.0	1.6	1.3
Northern America	19	23	22	21.8	—6.2	14.3	—0.3	2.2	2.0	—0.0	—1.0	—0.3
East Asia	110	120	117	8.7	—2.5	5.9	1.2	0.8	—0.3	—1.2	0.3	0.4
South Asia	189	270	326	42.5	20.7	72.0	2.7	2.3	2.2	1.8	1.4	0.6
Europe	38	39	40	2.1	2.3	4.5	—0.8	0.6	0.7	0.5	0.0	—0.0
Oceania	2	3	3	38.4	15.8	60.3	2.7	2.2	1.6	1.2	0.9	0.9
USSR	20	26	26	28.1	0.1	28.2	1.0	2.1	1.8	0.5	—0.5	0.0
School-age population 5-14 years												
World	830	1,088	1,381	31.1	27.0	66.4	1.6	1.7	2.0	1.9	1.6	1.3
More developed regions	197	191	208	— 3.0	8.9	5.6	—0.7	—0.6	0.7	1.1	0.6	—0.0
Less developed regions	633	896	1,173	41.7	30.8	85.4	2.3	2.3	2.3	2.1	1.7	1.5
Africa	94	143	225	52.4	57.6	140.1	2.6	2.6	3.2	3.2	3.1	2.8
Latin America	75	108	150	44.2	38.4	99.7	2.5	2.4	2.5	2.5	2.2	1.8
Northern America	45	40	46	—11.2	13.7	1.0	—1.7	—1.6	1.0	2.1	1.0	—0.5
East Asia	201	236	227	17.2	—3.8	12.7	0.9	1.2	1.1	0.3	—0.7	—0.4
South Asia	285	437	595	53.1	36.3	108.6	3.0	2.9	2.6	2.4	2.1	1.7
Europe	76	74	79	— 3.1	7.4	4.1	0.1	—0.6	—0.1	—0.6	0.6	0.3
Oceania	4	5	6	28.7	23.5	58.9	1.0	1.6	2.4	1.9	1.4	1.0
USSR	49	45	53	— 8.2	17.0	7.4	—2.1	—1.2	1.6	2.0	1.1	0.0
Working-age population 15-64 years												
World	2,103	2,847	3,870	35.4	35.9	84.0	2.0	2.0	2.1	2.0	2.0	2.1
More developed regions	691	806	887	16.7	10.0	28.4	1.1	1.0	0.9	0.6	0.6	0.7
Less developed regions	1,412	2,041	2,983	44.6	46.1	111.3	2.4	2.5	2.5	2.5	2.5	2.5
Africa	185	280	441	51.1	57.6	138.1	2.6	2.9	2.8	2.9	3.0	3.1
Latin America	152	237	362	55.5	53.2	138.2	2.9	3.0	2.9	2.9	2.9	2.8
Northern America	140	171	197	21.7	15.3	40.4	1.7	1.4	0.9	0.7	0.9	1.2
East Asia	364	735	921	30.3	25.3	63.3	1.9	1.7	1.7	1.6	1.5	1.3
South Asia	603	896	1,376	48.7	53.5	128.4	2.4	2.7	2.8	2.9	2.9	2.8
Europe	292	328	348	12.3	6.0	19.0	0.7	0.7	0.9	0.3	0.4	0.4
Oceania	12	16	21	33.9	31.9	76.6	2.1	1.9	1.8	1.8	1.9	1.9
USSR	154	185	204	19.6	10.4	32.0	1.5	1.1	1.0	0.7	0.4	0.9

				Old-age population 65+ years								
World	200	279	397	39.0	42.4	98.0	2.7	2.3	1.6	2.3	2.5	2.2
More developed regions	104	133	168	27.6	26.6	61.6	2.6	2.0	0.3	1.6	1.9	1.2
Less developed regions	96	145	228	51.4	56.9	137.6	2.8	2.7	2.8	2.9	3.0	3.0
Africa	11	16	27	48.5	71.9	155.3	1.9	2.7	3.3	3.7	3.5	3.7
Latin America	11	17	28	63.6	62.9	166.5	3.3	3.5	3.0	3.4	3.3	3.1
Northern America	22	28	32	29.5	12.8	46.1	1.9	1.7	1.5	1.5	0.8	0.1
East Asia	50	74	108	47.3	45.6	114.4	2.7	2.6	2.4	2.5	2.6	2.5
South Asia	34	53	87	55.0	64.9	155.6	3.1	2.7	3.0	3.2	3.4	3.4
Europe	52	61	73	16.1	20.2	39.5	2.2	1.4	−0.6	1.3	1.3	1.1
Oceania	1	2	3	42.6	29.4	84.4	2.3	2.7	2.1	2.4	1.8	1.0
USSR	19	27	39	43.6	41.8	103.6	4.0	3.2	0.1	1.6	3.8	1.6
				Females of reproductive age 15-44 years								
World	770	1,045	1,420	35.8	35.9	84.5	2.0	2.1	2.0	2.2	2.0	1.9
More developed regions	237	267	287	13.0	7.4	21.4	0.9	1.0	0.5	0.7	0.4	0.3
Less developed regions	533	778	1,133	45.8	45.7	112.5	2.4	2.5	2.6	2.6	2.5	2.4
Africa	75	112	177	49.8	58.8	137.8	2.6	2.8	2.7	2.9	3.1	3.2
Latin America	59	93	141	57.2	51.7	138.4	3.0	3.1	3.0	2.9	2.8	2.6
Northern America	47	61	65	28.9	7.2	38.1	2.0	1.9	1.2	0.7	0.4	0.3
East Asia	202	265	320	31.5	20.6	58.7	2.0	1.8	1.7	1.7	1.3	0.7
South Asia	231	343	531	48.2	54.9	129.6	2.4	2.6	2.8	3.0	2.9	2.9
Europe	96	106	110	10.6	4.3	15.4	0.6	0.8	0.6	0.5	0.2	0.2
Oceania	4	6	7	39.6	30.6	82.4	2.3	2.4	2.0	2.0	1.7	1.6
USSR	56	60	68	6.7	13.6	21.2	0.5	1.1	−0.3	1.2	0.8	0.5

USSR, 1 per cent in Northern America, 4 per cent in Europe and as much as 41 per cent in Australia and New Zealand between 1970 and 2000.

Children in ages 0-4

44. Planning should also take into consideration the special needs of young children below five years of age, who have particular needs of food, medical and social services etc. As table 6 shows, the anticipated increase for the world in the size of this group during the projection period, according to the medium variant, is 271 million, of whom 259 million or more than 95 per cent are in the less developed regions. Actually, four fifths of the total increase would be in South Asia and Africa alone. The shares of South Asia and Africa in this total increase are 51 per cent and 29 per cent, respectively.

45. While the anticipated percentage increase in the less developed regions combined is about 65 per cent according to the medium variant, there are two major areas where the projections indicate very high relative increase in the size of this group. These are Africa (126 per cent) and Latin America, excluding Temperate South America (88 per cent).

Old-age population

46. The most rapid growth is implied in the projections of the old-age group (65 and over), in the less developed as well as the more developed regions. It should be noted, however, that although the growth of this group is particularly rapid in the less developed regions (over 100 per cent during the projection period as may be seen in table 6), it constitutes only 5 or 6 per cent of the total population increase. On the other hand, the increase of about 60 per cent in the size of this age group in the more developed regions is particularly significant since it constitutes about 23 per cent of the total population increase.

Females in the reproductive ages

47. The reproductive segment of the population can well be represented by the females in the ages 15-44 whose regional patterns of growth are, as may be expected, similar to those of the working-age population. Thus, the medium variant increase in the size of this group during the 30 years under consideration is 113 per cent in the less developed regions as against only 21 per cent in the more developed regions. The substantial differences among the less developed regions are very instructive, since such differences are both a consequence and a determinant of fertility differences. Thus, while the medium variant assumptions imply an increase of females aged 15-44 of 68 per cent in East Asia (excluding Japan), the corresponding increases are 130 per cent in South Asia, 138 per cent in Africa and 152 per cent in Latin America (excluding Temperate South America). These last three figures are very revealing since they mean that, in the absence of a change in age patterns of reproduction, the current level of birth rates will have to be reduced by roughly 25-35 per cent in order for these three major areas of the world to have by the turn of the century the same number of births which they now have. Again, the problem will look even more serious when one turns to the data of some regions; and again, as in the case of the labour force, Northern Africa and Middle America are conspicuous, with medium variant relative increases equal to 147 and 182, respectively. Needless to say, the demographic problems of this category are not confined to fertility. An important problem will arise when efforts are made to draw these females into the labour force by providing them with employment opportunities.

URBAN AND RURAL POPULATION PROJECTIONS

48. Consistent with the projections of total population for the future 30-year period, projections of urban and rural population have also been carried out.[7] According to these, the combined urban population of the world may increase about 2.5 fold in the 30 years, and the combined rural population may increase by almost two fifths. Of the entire world population, 36 per cent were urban in 1970 and 50 per cent may be urban in the year 2000. (See table 7.)

49. Owing in part to different tempos of growth in total population among the world's regions, and in part to varying indications concerning the recent tempo of urbanization, the calculated prospects differ greatly among the different parts of the world. In the more developed regions, the urban population may augment from 693 million in 1970 to 1,118 million in 2000, that is, by 425 million, or 61 per cent. The urban population of the less developed regions, 622 million in 1970 and projected as 2,087 million in 2000, may grow more than threefold. The rural population of the more developed regions, totalling 391 million in 1970 and perhaps 250 million in the year 2000, would decrease by 36 per cent. By contrast, in the less developed regions, the rural population would rise from 1,914 million to 2,952 million, that is, by more than 1,000 million, or by 54 per cent. As a net result of these divergent trends, it is estimated that the proportion of total population concentrated in urban localities will rise from 64 to 82 per cent in the more developed regions, and from 25 to 41 per cent in the less developed regions (see table 7).

50. Concerning individual major world areas, the following may be noted. In Europe and Northern America, the urban population of the year 2000 may be 1.5 times that in the year 1970; in the Soviet Union, the multiplication may be to 1.8 times; in Oceania, to 1.9 times; in East Asia, to 2.6 times; in Latin America,

[7] The "urban" population has generally been estimated in accordance with the diverse national definitions of that term. The projection is based on a trend in the net difference between the growth rates of the urban and rural population. From its observed values for 1950-1970, this differential rate is assumed to change linearly in each region so as to attain the value of 2.75 per cent by the year 2000, this being an average of observed regional values.

TABLE 7. URBAN AND RURAL POPULATION, AND PERCENTAGE OF URBAN POPULATION, BY AREA AND REGION, 1970-2000

Area and region	Urban population (millions)				Rural population (millions)				Percentage of urban population			
	1970	1980	1990	2000	1970	1980	1990	2000	1970	1980	1990	2000
World total	1,315	1,791	2,419	3,205	2,306	2,610	2,927	3,202	36.3	40.7	45.3	50.0
More developed regions	693	830	977	1,118	391	353	306	250	63.9	70.2	76.2	81.8
Less developed regions	622	961	1,443	2,087	1,914	2,257	2,621	2,952	24.5	29.9	35.5	41.4
Africa	75	122	199	315	277	340	422	518	21.2	26.5	32.1	37.8
Eastern Africa	10	19	34	58	89	113	147	188	10.5	14.2	18.6	23.4
Middle Africa	7	13	22	35	33	39	45	53	16.9	24.5	32.5	39.7
Northern Africa	31	49	77	115	55	65	77	87	35.9	42.9	50.0	56.9
Southern Africa	10	14	21	31	14	18	21	25	41.2	44.9	49.8	56.0
Western Africa	17	28	46	76	85	105	132	165	16.3	20.8	25.9	31.6
Latin America	161	238	342	470	123	136	147	155	56.7	63.7	69.9	75.1
Caribbean	11	16	22	31	14	16	17	18	44.0	50.2	56.7	63.2
Middle America	36	56	86	126	31	37	42	47	53.7	60.6	67.0	72.8
Temperate South America	28	35	41	47	8	7	6	6	77.4	82.6	86.6	89.5
Tropical South America	86	131	192	267	70	76	81	84	55.2	63.4	70.3	76.0
Northern America	168	196	228	256	59	53	47	40	74.2	78.8	82.9	86.4
East Asia	246	363	498	645	681	724	737	728	26.5	33.4	40.3	47.0
China	167	256	363	484	605	651	670	668	21.7	28.2	35.1	42.0
Japan[a]	56	72	86	99	49	45	40	34	53.2	61.4	68.4	74.3
Other East Asia	23	35	49	63	27	27	27	25	45.5	56.1	64.7	71.3
South Asia	231	356	550	834	880	1,094	1,334	1,551	20.8	24.5	29.2	35.0
Eastern South Asia	56	89	140	213	229	285	349	405	19.7	23.8	28.7	34.4
Middle South Asia	145	218	333	508	604	753	921	1,075	19.3	22.5	26.6	32.1
Western South Asia	30	49	76	113	47	55	64	71	38.7	46.8	54.5	61.4
Europe	284	326	370	414	175	162	145	127	61.9	66.9	71.8	76.6
Eastern Europe	55	65	75	86	48	45	41	36	53.2	58.8	64.6	70.4
Northern Europe	59	64	70	77	21	20	17	15	73.9	76.7	80.1	83.8
Southern Europe	59	72	87	102	68	65	60	54	46.5	52.8	59.2	65.5
Western Europe	111	125	138	149	37	32	27	22	74.7	79.6	83.6	87.1
Oceania	14	17	21	26	6	7	7	8	69.9	72.5	74.9	77.0
Australia and New Zealand	13	16	19	22	2	2	2	2	84.2	86.9	89.4	91.6
Melanesia	0	1	1	2	2	3	4	4	10.2	17.6	25.8	32.9
Micronesia and Polynesia	0	1	1	1	1	1	1	1	27.6	32.2	37.8	44.1
USSR	137	172	210	245	105	96	87	76	56.6	64.2	70.8	76.3

[a] Urban population is that of "densely inhabited districts"

to 2.9 times; in South Asia, to 3.6 times; and in Africa, to 4.2 times; a multiplication to 4.2 times in 30 years corresponds to a sustained annual rate of growth of nearly 5 per cent. Whereas in Europe, the Soviet Union and Northern America, decreases in the rural population are foreseen, it is estimated that between 1970 and 2000 the rural population may increase by 7 per cent in East Asia, by 26 per cent in Latin America, by 31 per cent in Oceania, by 76 per cent in South Asia and by 87 per cent in Africa. It may be worth mentioning that even rural populations can be anticipated to grow faster in South Asia and Africa than the urban population in Europe and Northern America.

51. A calculation has been carried out by the United Nations suggesting the growth in large cities to be expected in the period up to 1985, [8] if the trend recently observed were to continue. Cities with 1 million or more inhabitants ("million-cities") numbered 162 in 1970, of which 83 were in more developed and 79 in less developed regions. By the year 1985, there may be a total of 273 such cities, 126 in more developed and 147 in less developed regions. The population contained in this increasing number of cities may nearly double in 15 years, from 416 million in 1970 to 805 million in 1985. The million-cities contained 31 per cent of the urban population of the world in 1970 and may comprise 37 per cent of the urban population in the year 1985. In this respect, the urban population will be no less concentrated in large centres in the less developed, as compared with the more developed, regions. By 1985, the million-cities may comprise 27 per cent of the total population in more developed regions and 13 per cent of the total (rural and urban) population in the less developed regions.

52. At the present juncture of history, ever more numerous agglomerations with 10 million or more inhabitants are emerging. Including surrounding suburbs, there were three such cities in 1970, namely (if correctly estimated) London, New York and Tokyo. As calculated, approximately 15 agglomerations may exceed 10 million inhabitants by 1985, namely, Bombay, Buenos Aires, Cairo, Calcutta, London, Los Angeles, Mexico, New York, Osaka, Paris, Rio de Janeiro, São Paulo, Seoul, Tokyo and the Rhine-Ruhr region, an expanding conurbation of large industrial cities in the Federal Republic of Germany. Though these calculations for individual cities are debatable, it is evident that in the coming 30 years urbanization will achieve unprecedented dimensions.

53. Implied in the projected tempo of urbanization are profound changes in the industrial and occupational composition of the labour force, a large change-over from traditional forms of employment to wage contracts, a widening influence of formal school education and of the mass communications media, the marketing of greatly increased commercial food supplies and rising costs of social infrastructure to secure at least minimum standards in housing, waste disposal, transportation, public safety, environmental amenities and so forth. The economic and social costs and benefits may vary depending upon the particular forms which urbanization may take, namely, whether the tendency of concentration in relatively few very large urban centres is to continue, or whether part of the rural-to-urban population transfers can be distributed among more numerous, geographically more widely distributed, towns and cities of lower order of magnitude.

[8] "Cities", for this purpose, are defined as urbanized areas, or agglomerations within the contours of dense residential settlement.

Projections of the number of households and families

54. The United Nations Secretariat recently made its first series of household and family projections, though provisional in nature, for the eight major areas and 24 regions of the world up to the year 1985. The method of projection is the "headship rate method". [9]

55. Table 8 shows the estimated number of households in 1970, 1975, 1980 and 1985 according to the medium variant. This series of household projections is based on the medium variant of population projections made by the United Nations Secretariat and based on the observed or estimated schedules of headship rates for regions by sex and age which were assumed to increase moderately in most of the cases. The future levels of headship rates were estimated by developing regional models based on data from countries within the region or from countries in a similar demographic situation and by regression analyses between sex-age specific headship rates and economic and social factors, mainly percentage of non-agricultural workers among the male labour force, *per capita* income, labour force participation rates and marital status composition.

56. From table 8, giving the projections of households and families by regions and major areas, the following observations may be drawn:

(*a*) The average size of household for the world was 4.47 in 1970. The projections imply that the average size is expected to decrease slowly to 4.39 in 1975, 4.29 in 1980 and 4.20 in 1985. This means that the rate of increase of the number of the households and families in the world will be faster than that of the total population;

[9] The headship rate denotes a ratio of the number of heads of households by sex, age, marital status etc. The "headship rate method" is the method which is the most widely used among the developed countries and perhaps the most reasonable in view of the current availability of census data and the present status of methodological development. In the headship rate method projections, headship rate by sex, age and/or marital status may be assumed to be constant, but it is realized that for many regions changing rates would present more realistic pictures of the future growth in the number of households and families. When population projections are available by sex, age and/or marital status, household and family projections can be obtained by summing over-all sex-age or all sex-age-marital status groups the products of projected population and projected headship rates. See, for methodological details, *Manual VII, Methods of Projecting Households and Families* (United Nations publication, Sales No. E.73.XIII.2).

TABLE 8 NUMBER AND AVERAGE SIZE OF HOUSEHOLDS BY AREAS AND REGIONS, 1970-1985

(Medium variant)

Area and region	Total number of households (thousands)				Average size of households (persons)			
	1970	1975	1980	1985	1970	1975	1980	1985
World total	812,957	916,837	1,036,669	1,173,508	4.47	4.39	4.29	4.20
More developed regions	320,370	351,518	383,902	415,965	3.40	3.26	3.15	3.06
Less developed regions	492,587	565,319	652,767	757,543	5.16	5.08	4.97	4.82
Africa	69,227	79,249	91,147	105,543	4.97	4.99	5.01	5.03
Eastern Africa	19,885	22,671	26,004	29,947	4.92	4.93	4.95	4.98
Middle Africa	7,384	8,306	9,349	10,576	4.86	4.86	4.90	4.96
Northern Africa	16,805	19,599	23,009	27,277	5.15	5.18	5.19	5.14
Southern Africa	4,595	5,235	5,939	6,782	5.07	5.13	5.24	5.34
Western Africa	20,558	23,438	26,846	30,871	4.93	4.94	4.97	5.02
Latin America	55,547	64,441	75,091	87,856	5.10	5.07	5.02	4.95
Caribbean	5,826	6,588	7,460	8,460	4.43	4.37	4.31	4.24
Middle America	11,856	14,039	16,738	20,114	5.69	5.69	5.66	5.57
Temperate South America	9,488	10,511	11,661	12,946	4.15	4.08	4.01	3.92
Tropical South America	28,377	33,303	39,232	46,336	5.31	5.26	5.19	5.10
Northern America	68,219	74,875	82,295	89,688	3.34	3.24	3.17	3.13
East Asia	191,282	219,501	250,618	285,247	4.86	4.61	4.37	4.14
China	131,915	172,524	195,945	223,142	5.04	4.83	4.60	4.36
Japan	28,297	33,388	37,704	41,541	3.66	3.29	3.09	2.92
Other East Asia	11,070	13,589	16,969	20,564	5.51	5.07	4.58	4.25
South Asia	213,645	245,239	284,345	332,373	5.27	5.28	5.23	5.09
Eastern South Asia	55,435	64,465	75,917	89,604	5.18	5.13	5.01	4.85
Middle South Asia	143,436	163,436	188,157	218,189	5.31	5.36	5.32	5.21
Western South Asia	14,774	17,338	20,271	24,580	5.22	5.17	5.15	4.94
Europe	144,244	153,872	163,829	173,561	3.20	3.12	3.03	2.97
Eastern Europe	32,989	35,474	38,240	40,584	3.16	3.05	2.94	2.86
Northern Europe	27,204	28,642	29,957	31,394	2.98	2.92	2.88	2.87
Southern Europe	34,011	37,046	40,182	43,413	3.78	3.62	3.49	3.36
Western Europe	50,040	52,710	55,450	58,170	2.97	2.91	2.85	2.81
Oceania	5,046	5,754	6,559	7,377	3.84	3.75	3.66	3.63
Australia and New Zealand	4,375	4,966	5,628	6,276	3.51	3.42	3.34	3.31
Melanesia	469	539	624	729	5.89	5.84	5.74	5.65
Micronesia and Polynesia	202	249	307	372	6.07	5.75	5.39	5.19
USSR	65,747	73,906	82,785	91,953	3.69	3.46	3.27	3.12

(*b*) The average size of household will decrease in the future in most of the major regions. This is a trend which will take place in parallel with the world-wide long-term fertility decline. However, in some regions of Africa, South Asia and Latin America, projected sizes show moderate increases during part of the projection period. This is due to the anticipated, continuous mortality decline which would offset the effect of some fertility decline that would take place in those regions;

(*c*) Another salient feature of average sizes of household by world regions is that a process of convergence is anticipated. It is clear from the table that at first, in 1970, there was more divergence in the average household size among different regions, particularly between the more developed and less developed regions. However, by 1985, the range of projected averages by regions tends to narrow down. This is mainly a reflection of the trend towards convergence among the major areas and regions of the world with respect to fertility, mortality and nuclearization of the family,

(*d*) Even though the less developed regions will still have relatively larger household size and, therefore, relatively smaller number of households compared to their size of population, their sheer magnitude of the number is stupendous and its share in the world total is far greater than that of the more developed regions. Both the absolute number of households and its share in the world total will be growing much faster than that of the more developed regions. In 1970, the proportion of the number of households in the less d eloped

regions stands at 60.6 per cent of the world total; but it is expected to increase to 61.7 in 1975, 63.0 in 1980 and 64.6 per cent in 1985. During the period 1970-1975, the number for the less developed regions will increase by 14.8 per cent in contrast to 9.7 per cent for the more developed regions; during the period 1975-1980, 15.5 per cent in constrast to 9.2 per cent; and during the period 1980-1985, 16.1 per cent in contrast to 8.4 per cent, respectively. It will be easy to see that, other things being equal, the already serious state of housing shortage and deficiencies in social welfare among the less developed countries will be aggravated in the future.

World population prospects beyond the year 2000

An overview

57. During the past few years, there has been growing general interest in long-range projections of the world population beyond the year 2000. [10] Indeed, the year 2000 is not in the very distant future. The purpose of this section is to present a series of speculative world population projections beyond the year 2000 by eight major areas and the more developed and less developed regions which are based on the extrapolations of the population projections for 1970-2000 under a certain set of demographic assumptions. Due to the paucity of space, only the medium variant of projections will be shown in this section.

58. The basic frame of reference for the present long-range projections is an assumption that stabilization of the world population will be achieved in the foreseeable future. It is assumed that fertility in every major area of the world will be reduced one by one to the net replacement level during the twenty-first century so that zero population growth will follow several decades later. It is obvious that the attainment of the net replacement level of fertility will not immediately produce stabilization of population growth. The reason for this is the tendency to perpetuate growth inherent in the age structures of growing populations.

Basic assumptions

59. The methods and assumptions underlying the present long-range projections employed fundamentally the same kind of methods as used in the short-range projections presented in the previous sections. Somewhat speculative assumptions were, however, introduced to the estimates of the future courses of fertility. Mortality levels are simple extrapolations of the levels to be achieved by the year 2000 until the highest target level is reached. With respect to the future volume of international migration, an assumption was made that it will ultimately become small and unimportant in the long run.

Fertility assumptions

60. In the present long-range projections, the fertility levels in the eight major areas, as measured by the gross reproduction rate, are assumed to decline continuously to the net replacement level (gross reproduction rate being between 1.016 and 1.023 according to mortality level) so as to maintain the corresponding net reproduction rate at the unity.

61. The levels of gross reproduction rates for major areas of the world for the period 1970-2000 were already projected in the revised series of United Nations projections as assessed in 1973 (interim), and these values became the basis for their further extrapolation. For each major area of the less developed world, a reverse logistic type of extrapolation was worked out for the period 2000-2100, so that the fertility declines already occurring in the less developed regions will continue, rapidly gathering momentum, and then taper off at least by the latter half of the twenty-first century. In the more developed regions, on the other hand, since they are assumed to be at or very close to the replacement level in the year 2000, only minor extrapolation of the fertility was necessary.

62. Since the levels of fertility are assumed to be widely different among the eight major areas even in the year 2000 and since it is unlikely that the net replacement level of fertility would take place at the same time, it was assumed that each individual area will attain the net replacement level of fertility one by one at different times. Hence, it was assumed that Northern America as an area will achieve the net replacement level of fertility by the period 2000-2005, followed by Europe by 2005-2010, East Asia by 2010-2015, USSR by 2015-2020 and Oceania by 2020-2025. On the other hand, for three less developed areas, namely, South Asia, Latin America and Africa, the timing of achieving the net replacement level was assumed to be considerably behind the above areas. Latin America was assumed to achieve the net replacement level by 2035-2040, South Asia by 2060-2065, and, lastly, Africa by 2070-2075.

Mortality assumptions

63. It was assumed that the mortality levels of all major areas of the world would also eventually converge and reach an upper limit of expectation of life at birth of 74.8 years (both sexes), but the period in which this limit is reached varies again in each area. These periods are 2015-2020 for Europe, 2030-2035 for Northern America and USSR, 2035-2040 for Oceania, 2040-2045 for East Asia and Latin America, 2065-2070 for South Asia and 2075-2080 for Africa. The West model life tables [11] were used for all major areas.

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[10] Several studies have dealt with the long-range speculative projections, including D. H. Meadows and others, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972); T. Frejka, *The Future of Population Growth: Alternative Paths to Equilibrium* (New York, John Wiley and Sons, 1973).

[11] A. J. Coale and P. Demeny, *Regional Model Life Tables and Stable Populations* (Princeton, N.J., Princeton University Press, 1966).

Long-range world population growth

64. Table 9 shows the medium variant of the world population projections for the more developed and less developed regions and the eight major areas by 25-year intervals beyond the year 2000 through the year 2125. The table, at the same time, shows percentage distribution of the world population by major areas Figure II depicts the future course of population growth beyond the year 2000 for the world, the more developed and less developed regions. Table 9, by assistance of figure II, clearly illustrates that the world population under the assumption of the eventual net replacement level of fertility will reach its peak at the size of 12,277 million by the year 2125. Actually, the speed of population growth will evidently abate after passing approximately the year 2050 Beyond the year 2075, it would become insignificant and after the year 2100, the population growth of the world would virtually come to a halt.

65. The enormously widening gap in the size of population between the more developed and less developed regions is probably the biggest single feature derived from the long-range projections. According to table 9, in 1970 the population of the less developed regions was 2,537 million or 70 per cent of the total world population. The size will increase by the year 2000 to 5,039 million or 79 per cent of the world total By the year 2125, the same population will become more than quadrupled to 10,709 million or 87 per cent of the world population. Between 1970 and 2125, the world population would increase according to the present assumptions, by 8,656 million, out of which 8,172 million or 94 per cent would be attributable to the population increase in the less developed regions Clearly, the future population growth of the world will depend upon that of the less developed regions. Closely related to the population prospects for the less developed regions, another most salient feature of the present long-range projections is the enormity and rapidity of population growth expected to take place in the three major areas, namely South Asia, Africa and Latin America The first area of remarkable growth is South Asia, the area covering from the Philippines and Indonesia to Lebanon, Turkey and Jordan, notably comprising such demographic giants as Bangladesh, India, Indonesia and Pakistan

66 According to the medium variant, the total population for South Asia will increase from 1,111 million in 1970 to 5,369 million in 2125, covering 44 per cent of the world population The second important area is Africa Because of its very high initial level of fertility, though it is assumed to decline gradually, the population growth will be maintained at a very large magnitude from 352 million in 1970 to 2,446 million in 2125, increasing its percentage share from 10 to 20 per cent in 2125 Evidently, the future relative weight of the population of Africa in the twenty-second century will be substantially greater than that of East Asia, which was the second largest area in terms of population size in 1970, only following South Asia By the year 2125,

Figure II. Future world population growth by the more developed and less developed regions, 1970-2125

(Medium variant)

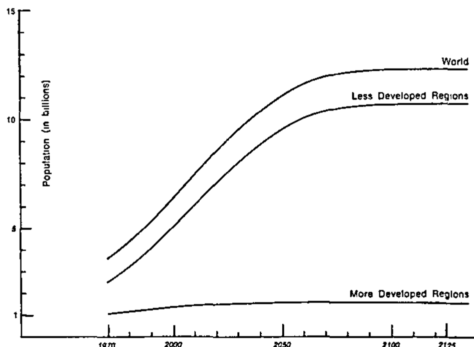


TABLE 9. TOTAL POPULATION AND PERCENTAGE DISTRIBUTION BY THE MORE DEVELOPED AND LESS DEVELOPED REGIONS, BY AREA, 1970-2125

(*Medium variant*)

Area	*1970*	*2000*	*2025*	*2050*	*2075*	*2100*	*2125*
			Population (millions)				
World total	3,621	6,407	9,051	11,081	12,048	12,257	12,277
More developed regions	1,084	1,368	1,510	1,563	1,572	1,570	1,567
Less developed regions	2,537	5,039	7,541	9,518	10,476	10,687	10,709
Africa	352	834	1,438	2,005	2,344	2,435	2,446
Latin America	284	625	963	1,204	1,300	1,308	1,309
Northern America	226	296	332	339	339	339	339
East Asia	926	1,373	1,650	1,761	1,775	1,776	1,776
South Asia	1,111	2,384	3,679	4,739	5,247	5,358	5,369
Europe	459	540	580	592	591	589	586
Oceania	19	33	43	50	52	52	52
USSR	243	321	367	391	398	399	399
			Population (percentage distribution)				
World total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
More developed regions	29.9	21.3	16.7	14.1	13.0	12.8	12.8
Less developed regions	70.1	78.7	83.3	85.9	87.0	87.2	87.2
Africa	9.7	13.0	15.9	18.1	19.5	19.9	19.9
Latin America	7.8	9.9	10.6	10.9	10.8	10.7	10.7
Northern America	6.3	4.6	3.7	3.1	2.8	2.8	2.8
East Asia	25.6	21.4	18.2	15.9	14.7	14.5	14.5
South Asia	30.7	37.2	40.6	42.8	43.6	43.7	43.7
Europe	12.7	8.4	6.4	5.3	4.9	4.8	4.8
Oceania	0.5	0.5	0.5	0.4	0.4	0.4	0.4
USSR	6.7	5.0	4.1	3.5	3.3	3.2	3.2

however, its prominence will fade away, taking a share of only 15 per cent of the world total population.

Ultimate levels of crude birth and death rates and age structure

67. Under the medium assumption, because of the very definition of eventual attainment of the stationary state of population as a result of the sustenance of the net replacement level of fertility, the crude birth and death rates of the world, as well as of all the individual countries, would by the year 2125 become stabilized and equal to each other at the level of 13.4 per 1,000. At the same time, the age structure would become stabilized and would have the following percentages: 20 for ages under 15, 63 for ages 15-64, and 17 for ages 65 and over.

FERTILITY TRENDS IN THE WORLD

*United Nations Secretariat**

1. Estimates of the crude birth rate for major areas and regions of the world for five-year periods between 1950 and 1970 are given below in the table An outstanding feature of this table is the contrast between levels and trends in the more developed and in the less developed regions During the first five-year period, the estimated average crude birth rate for the more developed regions (at 22.7 per 1,000 population) was already only slightly more than half of that for the less developed regions (43) During the period under review, this contrast was accentuated as the estimated average crude birth rate for the more developed regions fell more than twice as much as for the less developed regions, it declined about 19 per cent in the former and less than 8 per cent in the latter The average crude

* Population Division of the Department of Economic and Social Affairs

ESTIMATED CRUDE BIRTH RATES FOR THE WORLD, REGIONS AND SUBREGIONS, 1950-1970

		1950 1955	*1955 1960*	*1960 1965*	*1965-1970*
World total		*36*	*35*	*34*	*33*
More developed regions		22 7	21 9	20 3	18 0
Less developed regions		43	42	40	39
A	Africa	*47*	*47*	*47*	*46*
	Eastern Africa	47	47	47	47
	Middle Africa	45	45	45	45
	Northern Africa	46	46	46	45
	Southern Africa	42	42	42	42
	Western Africa	48	48	48	48
B	Latin America	*41*	*40*	*39*	*37*
	Caribbean	38	38	37	35
	Central America (mainland)	46	45	44	43
	Temperate South America*	26 9	27 0	26 5	24 4
	Tropical South America	45	43	40	39
C	Northern America*	*25 1*	*24 9*	*22.3*	*18 1*
D	East Asia	*36*	*31*	29	27
	China	37	32	30	28
	Japan*	23 0	18 2	17.5	17.9
	Other East Asia	37	42	39	36
E	South Asia	*46*	*46*	*45*	*44*
	Eastern South Asia	46	46	45	44
	Middle South Asia	46	46	44	43
	Western South Asia	46	46	45	44
F	Europe*	*19 7*	*19.2*	*18 6*	*17 6*
	Eastern Europe*	23 5	21 0	17.2	16 9
	Northern Europe*	16 6	16 8	18 0	17.1
	Southern Europe*	21.1	20 8	20 6	19 3
	Western Europe*	17 5	17 7	18 2	16 8
G	Oceania	*28*	*28*	*27*	*24*
	Australia and New Zealand*	23 5	23 3	22 3	20 4
	Melanesia	43	43	43	43
	Micronesia and Polynesia	44	44	44	43
H	USSR*	*26.2*	*25.3*	*22 0*	*17.7*

SOURCE Provisional estimates of regional crude birth rates available to the Unit tions Secretariat as of March 1974

Note Regions marked with an asterisk are those considered "more develo

birth rate for the more developed regions at 18 per 1,000 for the period 1965-1970 is definitely less than half the average crude birth rate of 39 estimated for the less developed regions.

2. In some respects, this contrast between more and less developed regions with regard to fertility levels and trends reached a climax around 1960. In 1950, fertility levels in a number of the more developed countries were still in a process of transition and at relatively high levels; by 1960, these declining fertility levels had either come to a halt or were gradually petering out. On the other hand, birth-rate levels seemed to be holding firm in the less developed regions, where signs of decreasing rates in a few small countries were offset by increasing rates in some others. The period around 1960 was the time when crude birth rates were typically above 40 in the less developed countries and below 20 in the more developed countries. While some less developed countries could be found with rates between 35 and 40 and some more developed countries had rates stabilized between 20 and 25, only a few countries could be found with crude birth rates between 25 and 35. The fertility component of the demographic transition seemed to have come to an end in the more developed countries and not yet to have begun in the less developed regions. The findings of a study of correlations between birth rates (or gross reproduction rates) and other indicators of economic and social development, using data from around 1960, showed that the fertility level was the sharpest discriminant function clearly distinguishing between more developed and less developed countries. [1]

3. Indeed, it was around this time that the relevance of the demographic transition for populations other than those of Europe or of predominantly European origin (e.g., Australia and New Zealand in Oceania, Canada and the United States of America in North America; Argentina and perhaps Chile and southern Brazil in South America) was seriously being questioned. Mortality had been falling fast and progress in economic development of varying sorts had taken place. It was being asked whether Japan (and the culturally related Ryukyu Islands) was merely an exception to the rule or the harbinger of many more to come. At that time, it was difficult to identify with assurance other populations of non-European culture that had clearly entered into the declining fertility phase of the demographic transition.

4. One decade later, as detailed results from the 1970 round of censuses began to become available, the meaning of the demographic transition continues to be debated. However, the forms in which the issues are phrased have changed. A study of the historical decline of fertility in the more developed countries has apparently ruled out the possibility of a generalized explanation of how economic and social development brings about the change from high to low fertility. It has even revealed the great difficulties of establishing a precise threshold or checklist of essential characteristics of modernization that will reliably identify when a population's fertility is about to fall. [2]

5. Furthermore, since around 1960, impressive changes in fertility have taken place both in many of the more developed countries and also in many (especially the smaller) of the less developed countries. The liberalization of the laws against induced abortion in 1955 in the socialist countries of Eastern Europe had led to dramatic declines in the crude birth rate in those countries where fertility was still relatively high and had accelerated the completion of the demographic transition. While this decline was still in process, a wave of rapidly falling birth rates set in among the more developed countries outside of Europe (Australia, Canada, New Zealand, the Union of Soviet Socialist Republics and the United States of America) where levels had been persistently higher than the average for more developed countries. Then, beginning apparently shortly before 1965, the crude birth rate began to fall substantially in many countries of Northern and Western Europe. The full magnitude of these declines is, of course, not reflected in the five-year average rates shown in the table.

6. By 1970, the gap between 25 and 35 in the crude birth-rate spectrum dividing the more developed and the less developed countries had virtually disappeared. Although the questionable reliability of birth registration data in some of the less developed countries makes it impossible to enumerate with certainty the number of countries that have bridged the gap, five or six such populations can be identified in Asia (including two where the crude birth rate has fallen below 25 per 1,000), six or seven more can be found in the Caribbean (including two with crude birth rates below 25), and elsewhere around the world at least five more countries had crude birth rates between 25 and 35 per 1,000 (Chile in South America, Costa Rica in Central America, Mauritius and Réunion in Africa and Fiji in Oceania). In addition, a number of countries can be observed whose relatively reliable birth registration data show substantial declines in the crude birth rate—although not yet to below 35 per 1,000 (e.g., Egypt, El Salvador, Guatemala and Tunisia).

7. What is the significance of the changes in fertility that have taken place between 1960 and 1970? How have they increased the understanding of economic and social conditions affecting fertility trends? What in particular is their meaning for the large population countries of the developing world? The answers one receives appear in part to be a function of the region with which the respondent is most familiar.

8. As concerns much of Asia, the important question being asked most frequently is whether and to what

[1] *Population Bulletin of the United Nations, No. 7, 1963, with special reference to conditions and trends of fertility in the world*, particularly chapter IX (United Nations publication, Sales No. 64.XIII.2).

[2] A. J. Coale, "The demographic transition", *International Population Conference* (International Union for the Scientific Study of Population (IUSSP), Liège, 1973), vol. I, pp. 64-65.

extent the concerted efforts and the resourcefulness of national family planning programmes have accomplished more than to provide contraceptive knowledge and facilities to the relatively limited sector consisting of those already motivated or predisposed

9 In Africa south of the Sahara, some differentials have been observed whose significance is usually interpreted very cautiously There is much concern with the belt of low fertility running across most of Central Africa and with the implication that fertility may well rise higher in many countries before a real decline sets in.

10. In Latin America, there is a tendency to envisage a wider gamut of possibilities Perhaps more than in any other region, the Latin Americans have insisted on accepting family planning programmes only on the condition that they are systematically integrated into programmes for economic and social development Family planning programmes are scarcely acceptable as a decompartmentalized activity.

11. Perhaps one has to adopt an interregional rather than an Asian point of view in order to realize the limitations of the ethnic argument involved in noting that the fertility decline in that region has been concentrated among only a few populations It is generally conceded that in India itself whatever decrease in fertility that has taken place is not very great It is of interest to note, however, that in some countries outside of Asia where at least half the population is of Indian origin (e g , Fiji, Mauritius and Trinidad and Tobago) pronounced declines in the birth rate have occurred evidently in part at least as a result of fertility regulation.

12 Furthermore, it is also true that there is no evidence of a significant decline of fertility in any African country south of the Sahara where the population is preponderantly black Nevertheless, in some islands of the Caribbean (i e , Barbados, Guadeloupe, Martinique and Trinidad and Tobago) the reproductive [illegible]

specified ethnic group

13 While each of the developing regions has its own perspective concerning the economic and social conditions affecting fertility trends, the outlook of fertility analysts most concerned with developed countries turns out quite understandably to be very dissimilar from that observed in any of the developing regions. The principal concern in most of the more developed countries is not (since they are the developed countries who have already undergone their demographic transition) with economic and social development as conditions affecting fertility trends What preoccupies them most is whether and to what extent observed declines in birth rates represent real changes in fertility levels in terms of completed family size or can be mostly explained by changes in age-sex composition, nuptiality or the inherently volatile character of period or cross-sectional measures of fertility While references may be made to potentially explanatory factors, such as economic and social differentials, new methods of contraception, inflation, changing marital patterns etc., the focus of endeavour is to establish the fact of the decline before entering upon a serious effort to explain it.

Asia

14 Systematic and comprehensive registration data on births as well as deaths exist in relatively few Asian countries or areas Registration statistics reported to the United Nations Statistical Office as "complete" are available for only Hong Kong, Israel, the Ryukyu Islands, Singapore, Sri Lanka and West Malaysia Satisfactory data are lacking for some of the most populous countries, such as China, India, Indonesia and Pakistan For the Arab countries, in South-West Asia, the data on births are either incomplete or lacking Other principal countries in Asia where satisfactory data are lacking include the Republic of Korea and the Republic of Viet-Nam, where registration statistics are of unknown degree of completeness On the other hand, Afghanistan, Bhutan, the Khmer Republic, the Democratic People's Republic of Korea, Laos, Nepal and the Democratic Republic of Viet-Nam do not publish such data

15. Official United Nations estimates show the population of Asia to have been slightly more than 2 thousand million in 1970, about 56 per cent of the total population of the world. Most of the population of Asia is concentrated in three regions the mainland region with a population of almost 800 million, Middle South Asia (dominated principally by India and Pakistan) with a population of about 750 million, and South-East Asia (especially Indonesia, the Philippines, the Republic of Viet-Nam and Thailand) with a population in 1970 of over 280 million Because of declining mortality and in most countries more or less constant fertility the rate of population growth was increasing during the period 1950 to 1970 so that the population estimates for 1970 represent substantially larger populations than in 1950 The total number of people in Asia as a whole is estimated to be over 50 per cent greater than in 1950 This average increase for the entire continent varied somewhat within the different regions The increase was only about 43 per cent in the mainland region; it was very close to 60 per cent in Middle South Asia and is estimated to have been in excess of 65 per cent in South-East Asia According to official United Nations projections into the future, the population of Asia will increase 84 per cent more between 1970 and 2000

16 Extraordinary population density combined with underdevelopment and often abject misery have obliged many of the countries of the region to adopt a pioneering world role in the use of family planning programmes as a means of reducing population growth in order effectively to imp[illegible] and

social development. It is appropriate, therefore, that an analysis of economic and social conditions affecting fertility trends in the region should include a review of the state of family planning programmes in these countries and of an assessment of their achievements.

17. The Governments of 12 countries [3] of the regions had formulated official population policies and, at the same time, had organized national family planning programmes as measures of policy implementation. Two other Governments (those of Hong Kong and the Republic of Viet-Nam) were giving active support to private or voluntary family planning programmes without, however, having adopted a formal population policy. The population policies of all the 12 countries have stipulated demographic goals in terms of specific reductions in population growth rates or crude birth rates. The achievement of these goals would still leave the countries with high rates of population growth; furthermore, their realization appears unlikely unless there occurs a modification of average desired family size as indicated by recent KAP surveys. Most programmes with goals also have set targets in terms of acceptors to be recruited (sometimes specific for each type of contraceptive method). In some cases, the targets (set with an eye to their feasibility) appear to be incompatible with the demographic goals.

18. Measuring family planning programme achievement in terms of impact on national fertility trends, it is pointed out, is an even more difficult endeavour, faced with numerous unsolved questions. Six populations can be identified in Asia, where, either because of reliable birth registration data or unusually accurate census data on population composition by age, it can be demonstrated that substantial declines in the crude birth rate have occurred since around 1960. Five of these countries or areas and the decreases observed are as follows: [4]

(*a*) Hong Kong, where the birth rate fell from 36.2 in 1959 to 20.0 in 1970;

(*b*) Republic of Korea, where the birth rate fell from 44.8 in 1958 to 32.0 in 1966 and perhaps to 30.0 in 1970;

(*c*) Singapore, where the birth rate fell from 44.3 in 1955 to 37.5 in 1960 and then to 22.1 in 1970;

(*d*) Sri Lanka, where the birth rate fell from 39.7 in 1950 to 36.6 in 1960 and then to 29.4 in 1970;

(*e*) West Malaysia, where the birth rate fell from 44.0 in 1955 to 40.9 in 1960 and then to 29.9 in 1970.

19. A paper prepared by the United Nations Secretariat, [5] contains a table with data on the crude birth rates and percentage changes in these rates over different periods of time that could be attributed to changes in the age structure of the population, proportion of women married and changes in marital fertility rates for Hong Kong, the Republic of Korea, Singapore, Sri Lanka and West Malaysia. Various independent studies have been published analysing the effects of changes in age structure and/or nuptiality on the declining birth rates in some of these countries or areas. In Hong Kong, most of the decline in the birth rate up to 1965 was a result of a smaller proportion of women in the reproductive ages; it was also in part due to a decline in the proportion of women married. [6] In Sri Lanka, the declining birth rate in the period 1963-1969 was due to decreasing nuptiality; however, in this country, changes in age structure had a counter effect which partially offset the effect of changing nuptiality. [7] A study of the recent decline in the crude birth rate in the Republic of Korea showed a substantial part to be due to increased age at marriage of women; almost two thirds of the total decline in the birth rate reflects a real decline in fertility. [8]

20. The Secretariat paper mentioned above enumerates and classifies the formidable obstacles encountered in measuring programme impact on fertility. One among these is that the programme is just one of the multitude of socio-economic variables affecting fertility. Fertility differentials are most commonly used as evidence of variables that influence fertility. Of particular interest in the present context are economic and social differentials related to various aspects of modernization and development. Education, female economic activity away from the home and urbanization have in a number of studies been found to be associated with level of fertility. One study showed all three of these kinds of differentials to be significant in West Malaysia. [9] Another study produced similar findings for Thailand. [10] It is difficult to isolate the programme effects from those of other socio-economic changes occurring concomitantly.

21. Despite this difficulty, attempts at assessing programme impact on fertility have not been lacking. Two

[3] China, India, Indonesia, Iran, Malaysia, Nepal, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka and Thailand.

[4] The Ryukyu Islands and Israel are omitted from this list because most of their declines occurred prior to 1960. In the Ryukyu Islands, the crude birth rate fell from 41.1 in 1950 to 25.0 in 1960 and then to 22.3 in 1970. In Israel, the birth rate declined from 34.5 in 1950 to 26.5 in 1960, after which it declined to 24.6 in 1962 and then fluctuated until by 1970 it had returned to its 1960 level.

[5] United Nations Secretariat, "Family planning programmes and fertility in the countries of the ECAFE region", *Population Debate*, vol. II, part eight.

[6] R. Freedman and A. L. Adlakha, "Recent fertility declines in Hong Kong: the role of the changing age structure", *Population Studies* (London), vol. XXII, No. 2 (July 1968), pp. 181-198.

[7] D. F. S. Fernando, "Recent fertility decline in Ceylon", *Population Studies* (London), vol. 26, No. 3 (November 1972), pp. 445-453.

[8] L. J. Cho and M. J. Hahm, "Recent changes in fertility rates of the Korean population", *Demography* (Chicago), vol. 5, No. 8 (1968), pp. 690-698.

[9] K. V. Ramachandran and G. Shantakumar, "Fertility differentials in West Malaysia", *Demography India* (Delhi), vol. 2, No. 1 (June 1973), pp. 91-103.

[10] S. Goldstein, "The influence of labour force participation and education on fertility in Thailand", *Population Studies* (London), vol. 26, No. 3 (November 1972), pp. 419-436.

such studies are referred to in that paper One found that "1970 contraception and use levels occur under rather widely ranging social, economic and health conditions".[11] The authors noted, nevertheless, that "in countries with national family planning programs, social, economic and health conditions do seem to bear some relationship to levels of contraceptive use" [12] The other study reviewed the findings of an areal analysis of fertility change with programme activity and other socio-economic characteristics in various countries of the ECAFE region and in every instance found strong support for programme impact on fertility [13]

22. By way of conclusion, available information indicates that family planning programmes and socio-economic development are an interacting process and neither can be assesed in isolation. The countries with national programmes in operation for seven or eight years can be classified into two categories in terms of fertility trend those wherein significant trends of decline in fertility have been achieved, but where an incipient fertility decline was already evident at the time of introduction of the programme, and those where there [illegible]

[illegible] Singapore have been cited as examples of the first group, India and Pakistan as examples of the second group In the first group where there was an incipient decline prior to the programme and where the rates of socio-economic development are high, family planning programmes have tended to accelerate the fertility decline

23. Involved here is a crucially controversial issue which the current state of scientific knowledge about human fertility is unable to resolve. To what extent can progress in development be said to have set the stage for the observed decline in fertility? To one leading authority, the Republic of Korea stands as a test case, "the strongest proof that a low-income, rural, 'traditional' society can make amazingly rapid progress towards the solution of its population problem. It also stands as a reminder... that if sufficiently large *per capita* inputs are made to skilfully directed family planning service, the population crisis will be highly responsive " [14]

[illegible] fall of fertility, but does not tell us what degree (if any) of modernization is necessary to produce a fall" [15]

[11] R. J Lapham and W. P Mauldin, "National family planning programs review and evaluation", *Studies in Family Planning* (New York), vol 2, No 3 (March 1972), p 46

[12] *Ibid*, p 47

[13] J A Ross and others, "Findings from family planning [illegible]

European history suggests to him that educational efforts to reduce fertility among rural poorly educated populations might be easier to implement effectively in some cultures than in others. [16]

Latin America and the Caribbean

25. *In most countries of Latin America*, as compared with those of Asia, the institutionalization of family planning programmes with Government sponsorship or support is a relatively new element (not counting Chile where, beginning around 1964, the National Health Service advocated the use of contraception in certain areas where the prevalence of illegal and unsanitary induced abortion had become a serious health problem). The national family planning programme that began officially in Costa Rica in 1967 [17] [illegible]

here It is perhaps for this reason that most analyses of economic and social factors affecting fertility trends give much less prominence to the possible role of such programmes and instead attempt a systematic and comprehensive review of all the diverse kinds of economic and social factors that might have affected fertility trends during the past two decades

26. While fertility rates in Latin America on the whole remain very high, slight declines have been registered in approximately half the countries of the region In Argentina and Uruguay, the decline in fertility took place at the same time as in most countries of Northern and Western Europe so that by the late 1930s the crude birth rates had already fallen to about 25 per 1,000 In addition to these two countries, substantial declines took place during the 1960s in Chile and in Costa Rica. In Chile, the decline which began around 1960 was from 37.0 in 1963 to 27 5 in 1970; whereas in Costa Rica, the crude birth rate fell from 48.3 in 1959 to 33.8 in 1970 The significance of recent declines experienced elsewhere in Latin America, however, is considered to lie not in their magnitude so much as in the probability that they are the precursor of a more sizable and continuous descent

27. In many of the countries and territories of the [illegible]

33 4 in 1955 to an adjusted 20.7 in 1970, in Trinidad and Tobago, the reported decline was from about 39.5 in 1960 to about 24.5 in 1970; in Martinique, it declined from 38 4 in 1958 to 27.4 in 1970, in

[16] *Ibid*

[17] J Reynolds, "Costa Rica: measuring the demographic impact of family planning programs", *Studies in Family Planning* (New York), vol 4, No 11 (November 1973), p 310

Guadeloupe, the decline was from 37.6 in 1958 to 28.3 in 1970; in Puerto Rico, the rate fell from 38.5 in 1950 to 32.2 in 1960 and then to 24.8 in 1970; in Jamaica, the crude birth rate declined from 42.0 in 1960 to 34.4 in 1970. In many of these Caribbean islands, migration is heavy and is age-selective and sometimes also sex-selective, so that care must be taken to allow for changes in age-sex composition in the interpretation of crude birth-rate trends. For example, a large proportion of the drop in the crude birth rate in Puerto Rico between 1950 and 1960 was caused by the heavy emigration of persons preponderantly in the high reproductive ages. Very striking also is the impact of age-selective migration on the Jamaican crude birth rate. The crude birth-rate in Jamaica would have fallen only very slightly were it not for the drastic change in the age composition of the population between 1960 and 1970; an analysis of the age-sex composition of the population in 1960 and 1970 shows that the volume and age distribution of male and female migrants were very similar. In Barbados, however, the crude birth rate decline of 39 per cent from 1960 to 1970 was slightly less than the 41 per cent decline in the total fertility rate, [18] indicating that female migration had virtually no effect on the observed change in the crude birth rate. Pending further investigation, the possibility remains that a migration almost exclusively male in composition could (by reducing the availability of male partners for the remaining non-migrant female population in the reproductive ages) have been responsible for the decline in both the crude birth rate and in the female age-specific fertility rates.

28. For the analysis of fertility levels and trends in Latin America, a simple organizational framework has been utilized whose underlying assumption is that the economic and social forces do not act directly upon the biological processes of reproduction, but rather on a set of intermediate variables which determine the risk of exposure at each of the stages of biological reproduction. In accordance with established practice, these intermediate variables are at first separated into those involving nuptiality and those affecting fertility within marriages or sexual unions. This second group is conveniently broken down into two additional categories; those which are involuntary (i.e., health and cultural practices that unintentionally affect fertility) and those which involve some conscious control of childbearing, such as contraceptive practice or induced abortion. First, the current state of knowledge concerning the importance of each of these three categories of intermediate variables in relation to fertility levels and trends in Latin America during the 1950s and 1960s has been reviewed, and then an attempt is made to assess the economic and social factors affecting changes in these variables.

29. The three intermediate variables relating to nuptiality are age at marriage or of entry into sexual unions, permanent celibacy (proportion of women never entering unions), and amount of reproductive time lost between or after unions because of divorce, separation or death. Because of the great diversity of forms of marital or sexual unions to be found in Latin America and in the Caribbean, data on union formation are rather sketchy. An estimate that the level of fertility in Latin America around 1960 remained at about half the biological maximum through women being single, separated, widowed or divorced [19] suggests the importance of the subject and the imperative need for intensive research. Much discussion centres on the significance of the various kinds of non-legal and sometimes very unstable marital unions. Although strong evidence has been brought to show that these informal unions have lower fertility than legal unions in Jamaica because of the loss of exposure time during periods between unions, [20] the relevance of these findings for Latin American countries has been challenged on the ground that larger number of children ever born to women in legal marriages frequently observed in census data is due to the more stable character of most consensual unions in Latin America (as compared with the Caribbean); these more stable unions usually begin at an early age and then later in life become legalized into formal marital unions with very large family size. It has also been argued that the Jamaican findings do not apply to a Caribbean population, such as Barbados, where contraceptive practice among the lower classes is common. [21]

30. In any event, very little information has been uncovered concerning the socio-economic processes affecting nuptiality patterns and trends in the region. An analysis of data from urban fertility surveys of Centro Latinoamericano de Demografía confirmed the findings of studies elsewhere that, wherever age at marriage is very young, more educated women tend to have higher ages at first union. However, this particular analysis was not able with any measure of success to explain real ages at marriage in terms of ideal ages at marriage. [22]

31. It is convenient to distinguish between the involuntary intermediate variables (e.g., involuntary abstinence from sexual intercourse, involuntary infecundity or sterility and spontaneous abortion or miscarriage) and the voluntary or conscious control

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[18] T. R. Balakrishnan, "A cost benefit analysis of the Barbados family planning programme", *Population Studies* (London), vol. 27, No. 2 (July 1973), pp. 355-356.

[19] A. O. Collver, *Birth Rates in Latin America: New Estimates of Historical Trends and Fluctuations*, research series No. 7 (Berkeley, Institute of International Studies, University of California, 1965), p. 47.

[20] J. Blake, "Family instability and reproductive behavior in Jamaica", in *Current Research in Human Fertility* (New York, Milbank Memorial Fund, 1955), pp. 24-41.

[21] B. Ram and G. E. Ebansk, "Stability of unions and fertility in Barbados", *Social Biology* (New York), vol. 20, No. 2 (June 1973), pp. 143-150.

[22] D. Yaukey, T. Thorsen and A. T. Onaka, "Marriage at an earlier than ideal age in six Latin American capital cities", *Population Studies* (London), vol. 26, No. 2 (July 1972), pp. 263-272.

intermediate variables (e g , voluntary sterility, contraceptive practice and induced abortion). The involuntary variables are closely related to uncontrolled or "natural" fertility defined by Henry as that which exists in unions wherein reproductive behaviour is not altered by the number of children already born.[21] Natural fertility results primarily from the inherent biological levels of fecundity, as well as from the biological effects of socially-determined variables such as health and nutrition The concept also encompasses, however, the unintended effect upon fertility of various cultural practices (e g , prolonged lactation and sexual taboos against intercourse upon certain occasions) and economic and social conditions (e g , the incidence of early widowhood because of prevailing levels of mortality and the temporary separation of spouses attributable to migration) Its levels, therefore, have been found to vary from society to society. However, the conscious action variables are much more sensitive to socio-economic change and satisfactorily account for past fertility declines

32. In a careful discussion of controlled marital fertility, strong generalizations explaining the transition from high to low fertility are not to be expected Nevertheless, it is not impossible to define a simple paradigm setting forth the basic pre-conditions necessary for fertility control. Three such pre-conditions are proposed, all three of which are necessary for fertility control to take place

(*a*) The motivation of a certain intensity to practise fertility regulation;

(*b*) The capacity to regulate fertility in the sense that the techniques of control are available, known and understood,

(*c*) The legitimacy of fertility regulation in the sense that its regulation must be "within the calculus of conscious choice".

33. To some extent, these pre-conditions may now exist in all the Latin American societies among certain groups in the larger cities and to a much more limited extent in some rural areas

34. A tentative list of five societal processes that affect the motivation to regulate fertility is presented as follows·

(*a*) Changes in the economy and/or increases in *per capita* income and services;

(*b*) The diffusion of new styles of life with a consumer orientation,

(*c*) Changes in family structure and in the family's relation to the national society,

(*d*) Changes in the role and status of women;

(*e*) Mass mobilization.

35. Urbanization and education (two commonly mentioned conditions) are not included in the list because they (especially if education is taken in the broad sense wherein all new learning situations constitute increases in education) are too general and ambiguous. However, various aspects of each have been subsumed in several of the processes outlined.

36 The application of this plausible list of processes to the countries of Latin America (Chile and Costa Rica) where the decline in fertility has been most conspicuous is very revealing about the hypothetical character of the understanding of fertility changes and the inability even to approximate the establishment of cause-and-effect relationships In applying the second process (the diffusion of new styles of life with a consumer orientation) to the situation in Costa Rica, it is noted that observed changes in levels of aspiration may accompany economic development even when the probabilities of achieving them are very limited (because there has been little redistribution of income or sharing in the benefits of development) With regard to Chile, several authors have suggested that the decline in fertility may have resulted from the increased political awareness and the altered aspirations of the mass of the population associated with the activities of rival political parties from 1964 onward

37 Three processes affecting the capacity to control marital fertility are proposed as important dimensions

(*a*) Diffusion of information through the mass media, education, contacts as a result of migration etc ,

(*b*) Changes in the roles and status of women in which greater communication between husband and wife appears to come about through a process which begins with changes in social structure affecting the education and employment of women,

(*c*) Introduction of family planning programmes, a relatively new element in Latin America, and therefore probably not very influential as a determinant of the declines that have taken place in most countries (for example, the family planning programme in Costa Rica began in 1967, whereas the decline in the crude birth rate can be traced back to 1960)[24]

This final inference seems applicable also to most of the Caribbean, where substantial declines have been observed in Trinidad and Tobago, where the Government-supported family planning programme dates back only to 1966 or 1967,[25] in Martinique and in Guadeloupe, where, following legal reform in France, significant financial assistance was provided by the national Government to the local family planning associations beginning in 1968.[26] It is quite possible, however, that in Latin America the heated debates that preceded the institutionalization of the programmes may

[21] L. Henry, "Some data on natural fertility", *Eugenics Quarterly*, vol 8, No 2 (1961), p 35

[24] J. Reynolds, *loc cit*, pp 310-316

', in The Popu-
[illegible]71), p 4, and
[illegible]le fertility and
[illegible]aft version of

[illegible]renthood Asso-

have increased the general knowledge of existing contraceptive methods.

38. Special note should be taken of Barbados as up to now one of the few developed countries in the world where there has been an important decline in fertility and where the establishment of the national family planning programme did not take place after the initiation of the fertility decline. In Barbados, the national programme was inaugurated in 1955 and the decrease in fertility can be traced back to 1960 or perhaps to a few years earlier. [27]

39. The fact that, except for Chile and Costa Rica, all the sizable fertility declines in Latin America and the Caribbean in the past decade or so have taken place in the densely populated Caribbean has ethnic implications that are worth mentioning. Aside from Puerto Rico (whose fertility trend involves circumstances too complicated for discussion here), all the populations where these declines have occurred (Barbados, Guadeloupe, Martinique and Trinidad and Tobago) are of non-Hispanic origin and culture. With the exception of Trinidad and Tobago, the population of all these islands is predominantly of African origin. In Trinidad and Tobago, the population is mixed African and (East) Indian, with the latter slightly outnumbering the former; according to a recent sample survey, [28] the Indians, despite their lower educational level and more characteristically rural residence (52 per cent compared with only 35 per cent for the blacks), have similar or slightly fewer children ever born in the ages under 25; the older Indian women, however, have substantially higher fertility than the Africans. The ethnic significance of Caribbean fertility requires further investigation. The high population density characteristic of the region does not offer a sufficient explanation of observed declines in view of the continued elevated fertility levels in the Dominican Republic, Haiti and Jamaica.

40. Two processes affecting the legitimacy of fertility control are distinguished: the influence of the Catholic religion, and *machismo* and its feminine counterpart, i.e. exaggerated masculinity and femininity. Concerning the former, it is noted that various studies have shown individual Catholics not to be significantly affected by their religious beliefs in their attitudes towards family size and the practice of contraception. It is pointed out, however, that the Church may have exercised some influence through its close relations with the ruling *élites*, who have often refused to legitimate the provision of contraceptive information and materials. The link between the *machismo* complex and birth control is yet to be clearly documented, although it is suggested that lack of communication between the spouses may lead the woman to base her view of what is legitimate on the *machismo* stereotype and not on the reality of her husband's view.

[27] T. R. Balakrishnan, *loc. cit.*, pp. 353 and 355-356.

[28] J. Harewood, *op. cit.*, chap. 1, p. 92 and table 1.21, chap. 2, table 4.9.

Africa

41. Despite significant strides taken in recent years to improve the situation, the paucity and poor quality of basic demographic information constitute a major problem in the analysis of economic and social conditions affecting fertility levels and trends in Africa. Relatively complete birth registration exists in only five countries or areas of the region (Algeria, Egypt, Mauritius, Réunion and Tunisia—in all except the first of which declining birth rates are found). [29] In the remaining countries, data have been obtained principally from demographic surveys. In the francophone countries, these surveys have generally been of the multiround type. In some countries, there have been population censuses of uneven quality and a number of KAP surveys have also been conducted. Estimates of fertility levels, trends and differentials are most frequently based either on stable population model analysis of obviously defective age composition data or on data from the Brass questions on children born and on infant and child mortality.

42. The available statistical data reveal the existence of substantial variations in the level of fertility. While some of the observed differences are undoubtedly more statistical than real, it appears beyond question that the reproductive behaviour of African populations vary considerably from one region to another and from one ethnic group to another. [30]

43. One subject of considerable concern that is discussed in the literature are the areas of relatively low fertility, observed especially in the countries of Central Africa (Cameroon, Chad, Gabon and the equatorial provinces of Zaire) and Mauritania in West Africa. Certain ethnic groups in the Central African Republic and Zaire have either ceased to grow or are declining in numbers. [31] There is common acceptance by investigators of the problem that the determinants of this phenomenon are complex, involving as they do a web of social, cultural, medical and phychological factors often very hard to disentangle. Among the commonly enumerated variables associated with this low fertility are conjugal mobility, the incidence of polygyny, widespread free unions, the breakdown of traditional values and customs, low agricultural yields and malnutrition, addiction to alcohol, practices of abortion and contraception, ill-health and disease, especially venereal disease. Several scholars who have devoted special attention to the question have arrived at the conclusion that the medical factor of venereal disease is para-

[29] In Egypt, the registered crude birth rate is reported to have declined from 42.8 in 1963 to 34.9 in 1970; in Mauritius, the crude birth rate has fallen from 49.7 in 1950 to 26.0 in 1970; in Réunion, the decline has been from 49.2 in 1955 to 30.2 in 1970; in Tunisia, the crude birth rate was 46.8 in 1960 and 36.1 in 1970.

[30] R. Clairin, "Les niveaux et les facteurs de la fécondité dans les pays africains francophones", *Proceedings, IUSSP Conference* (London, 1969), vol. I, p. 769.

[31] C. Blayo and Y. Blayo, "La population de l'Afrique", *Population* (Paris), vol. 27, No. 6 (November-December 1972), pp. 1094-1095.

mount.[32] In some cases, these diseases had been introduced at the end of the nineteenth century as a result of historical circumstances including contacts with visiting traders and European colonizers. Needless to say, the dispersion has been facilitated by some of the other factors mentioned as possible determinants: *divorce and conjugal mobility, polygyny and the general* breakdown of traditional values and customs

44. However, the emphasis of the present analysis is first on the factors responsible for the generally very high levels of fertility in most of Africa Then it moves on to consider how the forces of modernization (industrialization, development, urbanization, modern education etc) will eventually modify—or the extent to which they already have modified—the existing economic and social structures with the consequence that outmoded traditional values have to adapt themselves in order to clear the way for the transition from high to low fertility Lastly, a review is made of some of the traditional customs and values adherence to which have long kept African fertility levels considerably below the biological maximum Mention is made of the awareness that modernization will probably bring in its wake an erosion of these traditional low fertility practices As a short-term consequence of modernization, there will be forces set in motion both to increase and to decrease fertility. The resultant of these opposing forces may manifest itself differently in different places and among different sectors of the population with inconsistent, contradictory and confusing trends sometimes being reported

45. Before reviewing the traditional factors responsible for the current high levels of fertility in most of Africa south of the Sahara, it should be noted that the supporting evidence is usually based on research limited to only part of the region; it is quite possible, therefore, that some of the factors mentioned may not be relevant to all the countries. One factor almost universally mentioned and undoubtedly of general relevance is the high value placed on having many children in order to ensure the survival of the family, clan or tribe in conditions of very high infant and child mortality. Economic conditions mentioned as strengthening this value in these agricultural societies are the usefulness of children to replenish labour and to extend cultivation, and the regarding of many children (especially male children) as a form of security and support in old age. In some countries, such as Nigeria, for example, the Christian and Moslem religions have also reinforced this value.[33]

46 Although marriage in tropical Africa presents several unique aspects,[34] its virtual universality and its usual occurrence at an early age is widely accepted as an important determinant of prevailing high fertility levels. Ceremonies and other forms of social recognition, sometimes in the face of forceful demographic, *economic and social changes, tend to reinforce and* perpetuate the cultural attitudes concerning the supreme importance of marriage, motherhood and marital fertility. The stigma commonly attached to sterility (especially to barren women) and the inheritance of widows are mentioned as characteristics related to the high value placed upon marriage and childbearing

47 With modernization and development, a weakening of these traditional high fertility cultural values might be expected Indeed, evidence of such a weakening does exist in the form of lower urban than rural fertility in a number of countries and of an inverse educational differential However, the data on urban-rural differential fertility are not completely unambiguous,[35] nor is it clear whether these are emerging differentials or have in fact been in existence for some time The lower urban fertility in Ghana is attributed to a later age at marriage Ohadike, who in 1964 conducted a socio-demographic sample survey in Lagos (one of the most urbanized areas of West Africa), found many indications of transitional fertility values About as many respondents approved the large family ideal as rejected it, further, a sizable number of women expressed approval of family planning and a willingness to practise it Although desired family size was definitely still very high, the variational pattern by socio-economic status suggested a tendency towards lower fertility [36]

48 An analysis of the results of a 1967 KAP survey of men in rural Kenya suggests the obstacles a successful family planning programme in that area would have to overcome Although the men perceive the economic pressures of large families (40 per cent of the responses to the question "What is the best thing about having many children?" were "nothing good"), their real and ideal family sizes remain high (about six) and few have any knowledge of contraceptive methods The great majority of married men and women have not yet made any attempt to limit their fertility.[37]

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[32] A Romaniuk, "Infertility in tropical Africa", in J C Caldwell and C. Okonjo, eds, *The Population of Tropical Africa* (London, 1968), pp 214-224, A Retel Laurentin, "A ... [illegible]

[illegible] tropical Africa", *Proceedings IUSSP Conference* (London, 1969), vol III, pp 2167-2191

[illegible] Kenya", *Studies in Family Planning* (New York), vol 12 (December 1973), pp 351-355

49. The scientific literature on the subject contains many references relating to the existence of a number of cultural traits which (quite apart from pathological sterility or growing infertility with age) prolong the infertile period in the reproductive life of African women. Among the factors often mentioned are: prolonged lactation; sexual taboos against intercourse during lactation or upon certain ceremonial occasions; the esteem placed upon pre-marital virginity; high bride prices; the practice of polygyny; the high incidence of early widowhood; nomadism (which evidently leads to lower fertility than that found among sedentary populations in the same country); malnutrition and conjugal mobility; and various other forms of broken unions which impede the control of venereal disease. It is widely recognized that modernization and development may have (or already are having) the short-run effect of releasing these involuntary fertility controls and temporarily either offset or even outweigh the initiation of the transition from high to low fertility. One study in fact maintains that an analysis of fertility trends in the United Republic of Tanzania between 1957 and 1967, and analyses of the age structure of the populations in Gabon, Kenya, Southern Rhodesia and Uganda indicate strongly that fertility has been increasing in these countries. [38]

50. Although the population density of the Arab countries of North Africa is not great in absolute terms, the Sahara desert to the south forces most of the population to be densely crowded along the fertile coastal region (or along the Nile valley and delta in the case of Egypt). As a consequence, the region is relatively highly urbanized despite its primarily agricultural and rural character. [39] One study discloses the very early age at marriage of women in all these countries (although to a lesser extent recently in Tunisia), with men marrying at a markedly older age. [40] While the crude birth rate in Algeria has been fluctuating at a level close to 50 per 1,000 without any sign of a decline and data for Libya and Morocco are too deficient for the detection of a trend, the substantial change noted above for Tunisia appears to be a genuine decline. The somewhat smaller decrease in Egypt is regarded as less conclusive evidence of a declining trend. [41]

51. National family planning programmes were inaugurated in Tunisia and Egypt in 1966 and in Morocco in 1968; family planning activities in Algeria are limited to a government hospital in Algiers and a few clinics around the country. [42] The most vigorous programmes are the Egyptian and the Tunisian. [43] Undoubtedly, because of the impressive decline of the crude birth rate in Tunisia, its family planning programme has been most thoroughly evaluated. The analysis shows that only a small proportion of the decline can be attributed to the programme. Increasing age of marriage for women and changes in the age structure account for a substantial part of the observed change in the birth rate. [44]

52. The effectiveness of the Egyptian programme has been regarded as less than that of the Tunisian for two reasons: the smaller decline in the crude birth rate and its much greater reliance on oral contraceptives (the use of which cannot be taken for granted) than on intrauterine devices (IUD). [45] The greatest obstacles to family planning in Egypt are those economic, social and cultural factors (also found in other developing countries) which continue to enhance the value of the large family with many children. [46] It should be noted that the war in 1967 slowed down the tempo of the national family planning programme for some time. [47] Indicative of the still lingering adverse repercussions of the war was the deferment of the March 1970 census because the migrants from the Suez Canal area have greatly changed the internal distribution of the population. [48] Positive aspects are by no means lacking, however. Studies revealing the surprisingly common practice of induced abortion (despite public abhorrence and religious prohibition) are evidence that motivation to regulate fertility is present, especially in urban areas. [49] Further, the emancipation of women in the Arab world, which has proceeded indirectly as a consequence of their greater education and freedom to work outside the home, "was greatly precipitated in Egypt following the Revolution of 1952". [50]

The developed regions of Europe, Northern America and the Soviet Union; Australia and New Zealand in Oceania; Japan

53. For several reasons, the assessment of economic and social factors affecting fertility trends in the developed countries is unusually difficult. First, the assessment is premature because complete data from the 1970 round of censuses are not yet available. Secondly, the time period selected (1950-1970) is exceedingly awkward in the case of many developed countries which

[38] C. Blayo and Y. Blayo, *loc. cit.*, pp. 1095-1098.

[39] J. Vallin, "Les populations de l'Afrique au nord du Sahara: Maroc, Algérie, Tunisie, Libye, Egypte", *Population* (Paris), vol. 25, No. 6 (novembre-décembre 1970), pp. 1215-1219.

[40] *Ibid.*, pp. 1227-1228.

[41] *Ibid.*, p. 1229.

[42] R. Lapham, "Family planning in Tunisia and Morocco: a summary and evaluation of the recent record", *Studies in Family Planning* (New York), vol. 2, No. 5 (May 1971), p. 101.

[43] See, for example, "Le Maghreb", a special issue of *Population* (Paris), vol. 26 (March 1971), devoted exclusively to the Arab countries of North Africa.

[44] J. Vallin, "Limitation des naissances en Tunisie. Efforts et résultats", *Population* (Paris), vol. 26 (Special No.) (March 1971), pp. 181-204; R. Lapham, "Family planning and fertility in Tunisia", *Demography* (Chicago), vol. 7, No. 2 (May 1970), pp. 241-253.

[45] H. Shanawany, "Fertility policy in Egypt", *Fertility Trends and Differentials in Arab Countries* (Cairo, Cairo Demographic Centre, 1971), pp. 378-379.

[46] *Ibid.*, p. 383.

[47] *Ibid.*, p. 386.

[48] *Ibid.*, p. 388.

[49] *Ibid.*, p. 389.

[50] *Ibid.*, p. 392.

had earlier completed the transition from high to low fertility and in 1950 usually had atypically high birth rates, decidedly not the most appropriate as the base point of departure for an analysis of subsequent trends

54 In view of the fact that some of the countries included in this discussion had not yet completed a demographic transition by 1950 and that in most of those which had completed it the crude birth rate was at a higher than usual level, it is scarcely surprising to find that the over-all trend for the period under review is overwhelmingly downward Birth rates in 1970 were lower than in 1950 in 31 out of 32 countries; in a few instances, the decline was negligible (Austria, Spain and the United Kingdom of Great Britain and Northern Ireland), but in almost all countries, the decrease was at least 10 per cent, drops of the order of magnitude of 20 per cent were very frequent and substantially larger ones were not uncommon Only in Ireland was an increase (very small) recorded

55. The post-war fluctuations in crude birth rates in Europe and the Soviet Union [51] do not lend themselves to easy generalizations. The almost universal post-war "baby boom" lasted only a few years in most countries, and subsequent developments varied greatly between countries and regions, at least until the mid-1960s. The present analysis classifies these countries into five broad types of fluctuation patterns and then proceeds to analyse the impact of changes in age-sex composition and in nuptiality characteristics on the observed changes in crude birth rates in order to isolate marital fertility trends from the distorting effects of these factors Recourse is then had to data on births by parity, to data on achieved fertility by marital cohorts of various duration of marriage and to data on expected family size derived from national sample surveys in order to make a cohort analysis of the long-term period trends in marital fertility underlying the observed fluctuations in crude birth rates.

56. One of the five groups of countries with relatively similar fluctuations in the birth rate are those of Eastern Europe and the Soviet Union, where the common feature was a decline, usually of about 30-40 per cent, which began between 1950 and 1955 in most countries (although somewhat later in the Soviet Union) and stepped up its pace after the liberalization of legislation relating to induced abortion in 1955. This decline generally came to a halt in the mid-1960s and was followed in most countries by a reversal associated with governmental pro-natalist measures The other four groups of countries have in common a birth-rate decline, sometimes quite steep, that began in most instances around 1964. What distinguishes three of these groups from each other is the variation of birth-rate trends in the period from 1950 to 1964:

(*a*) Virtually continuous decline: Finland and the Netherlands,

(*b*) Relative stability or slight decline followed by a slight rise between 1960 and 1964: Denmark, France, Italy, Norway, Portugal, Sweden, Switzerland,

(*c*) Relative stability or slight decline followed by a sharp increase during the 1950s and early 1960s: Austria, Federal Republic of Germany, Spain, United Kingdom

57. Data for 1950, 1960 and 1970 on women aged 20-24 and currently married and on women aged 45-49 by marital status establish clearly that a significant increase in nuptiality took place almost everywhere in Europe, especially in the 1950s and often continuing on until the mid-1960s For Northern and Western Europe, the increases in the proportions aged 20-24 currently married are principally the result of a sharp decline from the previous very late ages at marriage characteristic of these countries [52] In the remaining countries, the increase is associated with a recuperation of the sex ratios distorted by war losses among men Similarly, the continuous increase principally in the countries of Northern and Western Europe of the proportion of women either married, widowed or divorced signifies a decrease in the proportion of women never-married

58. It is convenient to distinguish three demographic determinants or components of crude birth-rate trends (*a*) changes in age-sex composition; (*b*) changes in the proportion of married women to all women in the reproductive ages; (*c*) changes in marital fertility Standardization techniques are then employed to show the relative importance of each component for the observed changes in the crude birth rate for selected periods specifically relevant to the country concerned for each of 16 countries

59 Changes in sex composition are found to have [illegible] where war losses in the male population were subsequently made up For the remaining countries, changes in age-sex composition refer to changes in the age structure of the female population.

[51] These fluctuations were less severe in the remaining five countries In Canada and the United States of America, the birth rate fluctuated moderately until just prior to 1960 when it entered into a period of steady decline, in Australia and New Zealand, the movement was similar except that the sharp decline in the 1960s halted around 1967 and slight increases were subsequently registered, in Japan, the birth rate declined continuously until 1957 after which relatively mild fluctuations have taken place (except for the sharp changes around 1966, the Year of the Fiery Horse)

[52] Populations lying on the left-hand side of an imaginary line connecting Leningrad and Trieste, as described by J Hajnal, "European marriage patterns in perspective", in D V Glass and D E C Eversley, eds, *Population in History* (London, 1965), pp 101-143 Although nuptiality was never so low in Australia, Canada, New Zealand and the United States of America as in Northern and Western Europe, a study by P Festy, "Canada, United States, Australia and New Zealand, nuptiality trends", *Population Studies* (London), vol 27, No 3 (November 1973), pp 479-492, has shown similar trends in these countries A slow, long-term decline [illegible]

60. The analysis shows that, generally speaking, from 1950 up to the mid-1960s, decreasing proportions of women in the reproductive ages exercised a strong depressing effect on crude birth-rate fluctuations that approximately offset the positive effect of increasing nuptiality. Although there were several exceptions (generally not very substantial), the general tendency was for trends in marital fertility to parallel closely those in crude birth rates. After the mid-1960s, the effect of changes in age structure and in nuptiality tended to diminish. However, it is considered particularly significant for those countries in which the crude birth rate was declining that these two factors tended to join forces, with still slightly increasing nuptiality exercising the same positive effect on the birth rate as the changing age structure, because at that time the baby boom cohorts began to enter into the reproductive ages. In other words, changes in age structure and in nuptiality both tend to confirm the post-1964 decline in birth rates as evidence that the decline in marital fertility was even greater than that observed in the crude birth rates.

61. Once the widespread and substantial downward trend in post-war period marital fertility has been established fairly conclusively, the question arises whether and to what extent these period changes indicate changes in the ultimate size of families and to what extent they merely represent fluctuations or changes in the timing and spacing of births.

62. An analysis of current births by birth order is the first method utilized in this investigation. Despite the fact that changes in the average birth order may be influenced by changes in the timing of births (and also by changes in age structure and age at marriage), as well as by changes in family size, a declining trend in average birth order is consistent with declining family size; and, at the very least, is strong evidence that average family size is not increasing. Data on average birth order for 1950, 1960 and 1970 show a decreasing trend that ranges from very small in a few instances to very large. In most countries, the average birth-order trend follows closely the trend already observed for the crude birth rate and for marital fertility.

63. The second method employed data on achieved fertility by marital cohorts of 3, 6 and 10 years duration concluded at five-year intervals since 1948 yields less satisfactory results. One reason for this may be the dubious quality of the data.[53] Another reason lies in the very nature of the data. The comparison of achieved fertility of marriages of 10 years duration leaves out of consideration altogether the reproductive behaviour of couples married since 1960 who could quite conceivably have played a major role in the sharp period of marital fertility decline that took place in many countries after around 1964. On the other hand, trends in the achieved fertility of couples of less duration are subject to the influence of changes in the timing of births and, therefore, do not necessarily reflect trends in completed family size. It is not surprising, therefore, that the estimates assembled present an inconclusive picture with no clear indication of any trend.

64. A third method, data on "total number of births expected" (i.e., the sum of those births already occurred and the number the wife expected to have in the future) derived from national sample surveys lend strong support to the expectation that a genuine decline in marital fertility has been taking place and that the end of this trend may not yet have been reached. Trends are presented on average total number of births expected for successive marriage cohorts for nine countries. A declining trend that, with one minor exception, is continuous in all countries is very clear. A comparison of average total births expected for the terminal cohorts (those married before 1951 and those married after 1965) reveals declines of the following magnitude: 0.3 children in Denmark; 0.6 in Belgium, Czechoslovakia and Hungary; 0.8 in England and Wales; 1.2 in Poland; 2.0 in Finland.

65. The findings are of particular interest for those countries in which the transition from high to low fertility was believed to have been completed prior to the Second World War. For these countries, the question arises whether the decline in marital fertility since 1950 is a continuation of the transitional decline (after a lapse of several decades) or merely a recovery from the abnormally high post-war levels. The answer to this question does not lie within the scope of the present terms of reference, which are strictly limited to the period 1950-1970.[54]

66. Another important question that this analysis does not directly confront is the relationship between trends in cohort general fertility (i.e., of the total population) and the apparently declining trend of cohort marital fertility in many countries. The sharp drop in the proportion of women never marrying that has been taking place in most of the countries that had apparently completed their demographic transition before the end

[53] European censuses have not systematically asked for information on children ever-born; furthermore, in some countries that did ask the question in the 1970 census, the relevant tabulations have not yet become available. As a consequence, estimates of achieved fertility had to be made on the basis of current statistics and confidence in the reliability of these estimates is understandably not so great as one would like.

[54] Some information on this subject chances to be at hand for a couple of individual countries. In the United Kingdom, the period gross reproduction rate, after falling from 1.41 in 1964 to 1.16 in 1971 and then to a provisionally estimated 1.08 in 1972, was still far above the lowest level (0.85) recorded in the 1930s. The cohort gross reproduction rate estimated at 1.17 for the cohort that began childbearing in 1956-1960 is also substantially higher than the lowest recorded cohort gross reproduction rate of 0.95 for the cohort that began childbearing in 1926-1930. See *Report of the Population Panel* (London, March 1973), pp. 35 and 38-39. In the United States of America, the period general fertility rate (i.e., births per 1,000 women 15-44 years of age) had fallen from 122.7 in 1957 to 86.5 in 1969, still above the low rate of from 76 to 79 observed during the period 1933-1939. Provisional data for subsequent years show that the rate had dropped to an all-time low of 73.4 in 1972. Corresponding cohort data are not available. See National Center for Health Statistics, Monthly Vital Statistics Report, *Summary Report, Final Natality Statistics 1969*, vol. 22, No. 7 (1973), pp. 1 and 4.

of the 1930s[53] corresponds very closely with the same countries that experienced impressive declines in crude birth rates and evidently also in cohort marital fertility beginning around 1964 in Europe and around 1960 in Northern America and Oceania Evidently, opposing forces are at work in these countries· on the one hand, there has been an increase in the proportion of persons who marry and have families; on the other hand, the [illegible]

question that deserves to be investigated

67. An adequate discussion of economic and social conditions affecting fertility trends during the period under review would, of necessity, be very different for those countries which had completed the transition from high to low fertility prior to the Second World War (Northern and Western Europe, Northern America and Oceania), as compared with those countries where the transitional process had not yet run its course (Eastern and Southern Europe, Japan and the Soviet Union)

68. It is widely accepted that the factors associated with economic growth, industrialization and modernization were responsible for the change from high to low fertility in the first group of countries The precise mechanism by which these factors exerted their effect is imperfectly understood Recent studies strongly suggest that the relevant importance of determining factors in the process varied greatly from one setting to another The main outline, however, emphasizes gradually accelerating economic growth which brought in its train improved levels of living, usually declining mortality and a transformation of the economic and social structure of society. This transformation in turn involved increasingly large investments in the formation of qualified human resources. In this process, the family lost many of its former functions, especially that of an economic unit of production; on the other hand, parents assumed new responsibilities in providing for themselves and for their children the qualifications that would enable them to take advantage of the tremendous expansion of opportunities for individual activities outside the home. Education in many ways played a key role in changing the traditional relationship between husband and wife and between parents and children A very important consequence at the micro-level of the profound changes that took place at the macro-level is that the large family with many children lost so many of its erstwhile advantages that in net terms it became converted from an asset into a decided liability

69. While these same economic and social changes are also thought to have played an important role in the decline of fertility in the period after the Second World War in those countries where the transition from high to low fertility was still in process, for some of these countries, other circumstances ought to be singled out as having been of greater importance than in the first countries to reach low levels of fertility. One such circumstance is the improved position of women, especially with regard to opportunities for economic activity away from home, that occurred in the Soviet Union and in the socialist countries of Eastern Europe. Another circumstance that almost certainly served to accelerate the decline in fertility in these same countries and also in Japan was the legalization of and the providing of facilities for induced abortion under specified conditions

70 The economic and social conditions responsible for the sharp decline in period fertility rates that has recently been sweeping through the countries that had previously attained low levels of fertility are much more conjectural With regard to the significance of recent innovations in contraceptive methods, the European national sample surveys show these not to have been very instrumental except in Denmark and the Netherlands However, some of these surveys were conducted as long ago as 1966 and 1967, so that it is probable that the findings of these surveys overstate the tendency to continue to use traditional forms of contraception. On the other hand, in the United States of America and the other non-European countries where the modern contraceptives have been widely utilized, the decline in period fertility began half a decade or so before the popularization of these methods.

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[53] Excluding France, where the proportion of women aged 45-49 never-married decreased only slightly, from 11 per cent in 1950 to 9 per cent in 1970

INTERNATIONAL MORTALITY TRENDS: SOME MAIN FACTS AND IMPLICATIONS

*George J. Stolnitz**

SUMMARY OF FINDINGS AND PERSPECTIVES

1. The current rapid growth of world population, the greatest in history, derives mainly from recent mortality declines in low-income regions. Such declines have been on a scale and at rates without precedent in any earlier era, suggesting thereby that the traditional links between mortality and levels of living have been greatly loosened. For this reason, they promise to sustain extraordinarily high growth of population for decades to come, not only in the low-income regions but globally, assuming no political catastrophe or severely adverse climatic shifts. The more usual concerns held by many, that economic, ecological, social or similar disasters would subvert the recent declines, have not been borne out. Rather, the weight of evidence and causal interpretation leans strongly to the outlook that the past declines in low-income areas will be followed by further reductions, at probably a slower rate in cases where decline has already been substantial, but at again impressively steep rates of change in areas which have been slow to introduce modern systems of disease and death control.

2. Slower growth as a result of future mortality trends in underdeveloped areas appears much more likely to come from the effects of mortality "downtrends" on fertility than from "uptrends" in mortality itself. Although the nexus between changing longevity and fertility attitudes or practice is complex, it appears likely to prove to be a highly significant one, as knowledge concerning effects accumulates. Certainly the sudden emergence of major concern with world, regional and national population problems has been closely associated with high rates of growth in numbers. The rapid proliferation of family planning programmes, for example, is surely related to such rates. At the individual or household level, similarly, it seems safe to hypothesize that rising survival chances of children and parents —once these are confirmed by lengthy experience—will operate to reduce desired fertility, not raise it. Although desired fertility is not the sole determinant of actual fertility—longer marital durations as a result of increased longevity being another which is related to mortality, for example—it may well be decisive in the long run, as the gap between children ever born and surviving number of children falls below traditional expectations.

3. Past and prospective mortality declines in low-income countries are also likely to have major impact on their output and labour productivity trends, other key areas of development policy which merit greatly enhanced evaluation. Here again, the contribution of gains in longevity to human resource development, and thereby to socio-economic development more generally, would seem clear, but will require close research and policy attention in the coming decades.

4. As a result of disparate trends within individual low-income areas, mortality and longevity differentials today within and between high-mortality regions are often close to historic highs. International experience during recent decades and earlier periods suggests that opposite tendencies, which lead to reduced differentials, can become predominant during the remainder of this century, provided that policy attention to mortality control continues to expand and intensify.

5. In the upper-income regions, longevity trends have apparently become dampened by a kind of technical ceiling effect. Full elimination of death in the first 50 years of life would lead to only limited gains in life expectancy at birth, or total longevity. Such gains would be far smaller than the actual trends encountered within a brief number of recent decades. Similar evidence of a ceiling effect can be found in the pronounced convergence of average mortality throughout the low-income parts of the world, despite their great geographical spread and their often very large differences in social, economic and political circumstances. Today, the upper-income areas are probably more homogeneous in terms of mortality than ever before in their history and the differences are still narrowing.

6. Unless longevity in these areas begins to fluctuate, or a major-scale medical breakthrough affecting upper-age mortality occurs in some places which cannot be duplicated by others, sustained long-run further convergence appears inevitable. Neither condition for divergence seems probable. Any great progress in upper-age longevity as a result of medical advance is likely to become well and rapidly diffused throughout the low-income regions, while mortality setbacks from infectious sources appear sure to be curbed by national measures and international co-operation.

7. Although mortality conditions and prospects in upper-income regions appear stabilized, at least for the moment, in over-all terms, three sub-aggregative tendencies are worth noting. One concerns the continued

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rise of female-male differences in conditions of high-level longevity, especially at the childhood and young adult years. Almost without exception, national differences in expectation of life at these ages are the largest ever found in the modern era, following unbroken runs of ever-widening differences over the past half a century Whether future decades will resemble the past will depend in part upon the rapidly changing social roles of women with respect to family formation, labour force and life styles more generally The presumption from past correlations is that such changes are not determining, but this remains to be seen Also involved in this respect may be a novel possibility, that male longevity at some ages may fall, at least in a number of high-income areas for a period of time

8 Recent declines in male upper-age life expectancy, the second pattern to be noted, have occurred in a number, still small, of high-income populations, while the cessation of any significant uptrend can be observed for many more Both patterns, if continued, would be the first such encountered in over a century of recorded trends. It can be anticipated, however, that the reversals involved are likely to come under increasing scrutiny and resistance by Governments and individuals, as the facts become better known.

9. Thirdly, mortality in nearly all upper-income countries is already so low during the first half a century or so of life that the main leeways for further major advances in age-specific survival chances are found, broadly speaking, beyond age 50 Should the largest future increases in survival rates begin to occur at the upper ages, the effects on age composition of the population would become very different from what they have been in the past Previously, such effects were highly limited and tended to reduce average age. With the main increases in survival rates occurring at the upper ages, however, the effects would tend to become much more pronounced, not only raising average age, but raising perceptibly the fractions of total population in the upper and even very advanced years of life.

10 The great thrusts to international convergence of mortality levels in recent decades—both within the upper-income group of countries and between these and large parts of the low-income group—suggest the operation of deep-rooted and persistent causal forces If these continue, the biblical longevity touchstone of 70 years, regarded through the ages as a hope for very few, may become by the end of the century the accepted expectation of most of the world population

Introductory remarks

11 Mortality trends in the past few decades have been the dominant cause of the greatest acceleration of world population in history. Although gains in longevity are encountered in all regions, rich and poor, their extraordinary pace in low-income areas has brought about enormous differences between actual population growth and its prospects in the economically developed countries, on the one hand, and the less developed countries, on the other. As a result, international interest in the evolution of world mortality has come to have much more than humanitarian and demographic aspects, primary as these are. To an unprecedented extent today, mortality trends and their consequences are centrally associated with the concerns of political leaders, economic development, the course of international relations and the prospects for world and regional ecological balance At the same time, given the importance of longevity for individual decisions and social arrangements, current and prospective mortality levels and trends will continue to have evolving major impact on fertility aspirations, the role of women, family formation patterns, working-life expectation and attitudes towards modernization

12 In the developed regions, the specific nature of such effects will depend upon whether their marked, century-long uptrends in life expectancy will come to a halt or be reinvigorated by noteworthy breakthroughs in the diseases of old age In the less developed regions, the effects will depend upon whether the remarkable trends of recent decades prove capable of being sustained and further extended over time and space.

13 The present paper seeks to provide some of the main factual and interpretive background needed for approaching these broader ramifications of mortality trends. The next section summarizes the empirical evidence under six headings. recent levels, trends, stability of trend directions, world-wide thrusts to convergence, differences by sex; and changes by age The final section takes up causal aspects, trend prospects, effects on population growth rates, future sex differentials and age patterns of change

14 A selective but substantial body of empirical materials is included as statistical support for the discussion [1] It will be seen that by and large the same populations appear in tables 2 and 3, which are limited to data rated as reasonably reliable [2] The extent of coverage varies somewhat with respect to life expectancy, since more measures of life expectancy at birth are available than for other years. [3]

[1] The broad intervals used in table 1 are intended to be



(*a*) Recent population size over 100,000.
(*b*) Death registration data recently classified as "reliable" by the United Nations.
(*c*) At least one measure of change available for a decade or longer since the Second World War or between pre-war and post-war
A very few subnational populations (all distinguished by the United Nations in its statistical compilations) are presented because of their special interest The life-table periods shown in table 2 are integral to its interpretation, since such periods are far from uniform All life tables are treated as if dated at the mid-point of their calendar period of reference.

[2] Technically, "reliable" as used here means rated "C" by the United Nations

[3] Romania, for which life expectancy is shown at ages 0 and 60, but not 30, illustrates this possibil

15. Throughout, attention is directed separately to the developed and the less developed regions. The former consist of Europe, North America and Oceania very nearly, while the latter comprise almost all of Africa, Asia and Latin America. Global aggregation of these regions as of now or foreseeably would make little sense, given the vast differences still holding on average between their mortality levels, trends or prospects. Indeed, even the use of these groupings alone is mainly justified on the ground of simplicity. Mortality differences among developed areas are not beneath attention today and were considerably higher in the past, while the contemporary range of experience among the less developed countries is enormously larger (and may have been growing). National variations among of less developed countries' populations today are often far greater than differences between some less developed and developed areas. Moreover, economic and social change in some parts of the less developed regions has been so rapid, even over relatively short periods, that any statistical basis for making distinctions between the developed and the less developed countries must be somewhat artificial and subject to change at the boundary.

16. The main criterion for determining these classifications was 1970 national income *per capita* as reported by the United Nations in its latest available annual summary.[4] As a general rule, a value of $900 (hence roughly one of $1,000 for gross domestic or gross national product *per capita*) was used as the dividing line.[5]

17. The "higher income" or developed country category includes all of the countries which were industrially advanced by the end of the nineteenth century, in addition to those which have experienced largely completed transitions from rural to non-rural economies during this century. Included are all of the lowest mortality countries of the past 100 years or more and essentially all those which can be documented by reliable and long-continuing time series.

18. The "lower income" or less developed country group has, in effect, mirror attributes of the ones just noted, being characterized by limited industrial transition, higher (as well as more highly variable) mortality, limited reliable documentation even today and much less reliable data still for pre-1940 or pre-1950 periods.

Main facts

Recent levels

19. An overview of international mortality during recent years is best documented by measures of expectation of life at birth;[6] though significant supplementary information can be elicited, with care, from crude death rates,[7] trends in infant mortality rates[8] and both levels and trends in expectation of life at selected ages beyond birth.

20. Maximum national longevity today (which is undoubtedly well recorded) is something like twice the minimum levels on record (which are subject to considerable error at best and may not be representative of lowest values internationally). With male and female measures averaged, the range extends from 70 to 75 years at the high end down to from 30 to 35 at the low, as shown in table 1. Interestingly, therefore, the ratio of developed country to less developed country average longevity is not far from the corresponding ratio for fertility as measured by the gross reproduction rate.

21. Over-all mortality conditions have become remarkably similar among the world's upper-income

TABLE 1. DISTRIBUTION OF COUNTRIES ACCORDING TO LIFE EXPECTANCY AT BIRTH (BOTH SEXES COMBINED), SINCE 1960, AND *per capita* INCOME LEVEL

Life expectancy at birth	*Lower income countries*	*Upper income countries*
30-35	5	
35-40	13	
40-45	19	
45-50	9	
50-55	17	
55-60	12	
60-65	12	
65-70	12	13
70-75	4	23
TOTAL	103	36

SOURCE: United Nations, *Demographic Yearbook*, various years.
Note: For description of definitions, see text.

[4] United Nations, *Yearbook of National Accounts Statistics 1971*, vol. III, *International Tables* (United Nations publication, Sales No. E.74.XVII.3), table 1B.

[5] For estimates of gross national product *per capita* for non-market and market economies, see International Bank for Reconstruction and Development, *World Bank Atlas 1972—Population, Per Capita Product and Growth Rates.* The data suggest, somewhat at variance with other sources, that one or more of Bulgaria, Romania and Yugoslavia should be classed with the "lower income" group. Two boundary cases were Singapore and Spain.

[6] Measures of life expectancy at birth have the advantages of summarizing mortality at all ages; being affected by age-specific mortality rates only and not affected by age composition; reflecting actuarial attempts to adjust for errors in the basic data (at least frequently); being relatively insensitive to errors at the upper ages, where measurement is often especially inaccurate; and providing tolerably accurate results for a much larger number of areas than can be similarly well documented by death rates or infant mortality rates. Undoubtedly, however, many of the estimates in table 2 are usable as orders of magnitude only.

[7] Any crude death rate is numerically determined by two sets of values: age-specific mortality rates by sex and the relative sizes of the various age-sex groups in the population. The former values relate to mortality proper, but the latter depend upon the previous demographic history of the population. For this reason, comparisons of crude rates over time and space tend to be significantly distorted whenever the populations involved have had highly differential demographic histories.

[8] Because such measures relate annual deaths under age one to live births, mortality and public health analysts often characterize them as especially sensitive indicators of environmental conditions.

populations. Without exception, national life expectancy at birth in the developed areas falls within a range of above 65-75 years; and the range might well be reduced below the indicated range, to about seven years, if all measures were as of the same calendar period.

22 The degree of homogeneity in developed countries is the more noteworthy in view of the great geographical spread of the populations involved and their often pronounced differences in economic levels, social conditions and political systems Moreover, although all belong in an upper-income range, generally speaking, the higher *per capita* measures within the group are often 50-100 per cent above the lower values Even with full allowance for vagueness in income comparisons, the wide disparities in levels of living which these differences index are clearly existent and real by other criteria That all three of the lowest income European populations are found in the 65-70 interval of values further confirms the strength of non-income influences on modern mortality conditions, at least when mortality is considered in the aggregate

23 In contrast, the range of mortality levels in less developed countries continues to be very great, not only for all the populations combined, but within individual continents. Underlying the full range of approximately 35-70 years shown in table 1 is a subrange of from 30-

income areas combined.

24. Almost one fifth of the lower-income areas included in table 1, nearly all in Africa, are not yet beyond the 40-year level reached by Western Europe about 1825-1850 Conversely, over one fourth of such areas, mainly in Latin America and Asia, are beyond the 60-year level first reached by the countries with the lowest mortality as recently as the 1920s

25. Since crude death rates are greatly affected by age composition, they are likely to be of much greater value for documenting trends within countries over time than international differences over space. The phenomenally rapid downtrends of mortality in less developed regions in recent decades have been such as to render many of their crude death rates (at least those which can be reliably measured) almost indistinguishable on average from rates of developed countries. This was not the case before 1940, when differential mortality dominated age composition in determining analogous comparisons of developed and less developed countries. Since the situation has become reversed today, even broad comparisons of crude death rates should be limited to populations with similar fertility (and migration) histories, such as may be found among parts of Latin America, Asia and Africa, or among selected parts of the high-income regions. The main comparative use to be made of death rates shown below for recent decades, accordingly, is to document comparative changes over time.

26 Since infant mortality rates are unaffected by age composition, their contrasts with regard to developed and less developed countries are in general agreement with those holding for life expectancy. As a rule, the highest income areas show recent rates below 25 per 1,000 and most have rates below 20, the few cases above 30 all involve Eastern European countries with incomes substantially below the upper-income norm In contrast, practically all of the less developed countries listed as having reliable data show rates above 35-40, with nearly all noteworthy exceptions encountered among small, island-type populations

27 These contrasts undoubtedly understate the true differences by very large margins The less developed countries with usable data are few, atypical by virtue of the very fact of providing reasonably accurate indicators, include an undue representation of island populations, exclude for all practical purposes the largest and poorest mainland areas of Africa, South America and Asia, and almost surely tend to be more often described by downward-biased measures than by upward-biased ones [9]

28 Compared with the upper-income areas, for which information can be assumed to be essentially complete and accurate, the Latin American average may well be from 3 to 4 times the developed country average of about 20 per 1,000, that for Asia, perhaps, from 5 to 8 times higher and that for Africa from 5 to 10 times higher

29 Measures of life expectancy at age 30, which

are again accurate and comprehensive enough to permit firm generalization, indicate clearly that 30-year old males in developed countries have a further average lifetime of 40-44 years, while females have an expectation of 45-48 years Interestingly, these are not far from the magnitudes of expectation of life at birth in the same regions as of 1850. The 30-year old today in developed regions can expect to live as long as the infant born about a century ago

30 The available recent data for low-income regions are so limited and so subject to statistical doubt that their presentation is probably best viewed as advising against generalization. A weak statement based on the data usable for about 1960 (after allowing for upward biases in coverage and measurement and also for some reverse or downward bias because of non-recency) is that the averages for developed countries just cited would appear to be highly exaggerated upper bounds for all but a very small fraction of the world's low-income areas

31. Much the same kinds of comment hold for the available measures of life expectancy at age 60. For

[9] A major source of error involves infants who die shortly after birth, hence are often excluded from both birth and death registration.

populations of developed countries a range of 14-18 years for males and one of 17-21 for females seem strongly indicated. For low-income areas, the data in existence may be more misleading than helpful. About half of the values for males in less developed countries seemingly match or exceed the corresponding in developed countries median of somewhat under 16 years, an unlikely actual state of affairs even for the selected low-income areas involved. For females, the comparisons appear more reasonable, since very few of the low-income values exceed the median in developed countries of approximately 19 years, but the improvement in comparative accuracy is only by contrast with males.

32. In summary, both middle-adult and upper-age longevity in the developing regions must, on average, be far below the high-income norm, though specific magnitudes cannot be estimated.

Trends

33. A pervasive aspect of twentieth-century mortality changes is that the countries which were late to embark upon sustained transitions have tended consistently to out-perform the countries with earlier transitions. Annual increases in expectation of life at birth in the countries with longest histories of mortality decline—i.e. Western, Central and Northern Europe, the United States, Canada and Oceania—have tended to be less than one-half year since about 1920-1930, were often closer to one-third year and have typically decelerated in the post-war era. The largest gains among developed countries in practically all decades over the past 25-50 years have involved Eastern and Southern Europe or such individual late-comers as Japan and Puerto Rico. Moreover, these same areas have often experienced rising gains, or at least not falling ones, as between the interwar and later periods, in further contrast with their predecessors.

34. In the low-income regions, where widespread mortality transitions have come last in time, the shifts have been of stunning rapidity, sometimes at rates of change which are without precedent in recorded demographic history. [10] The available evidence, though all too sketchy, suggests that average annual gains approximating two thirds of a year have not been infrequent in recent decades and that their momentum may endure over considerable periods, as in Chile, Mexico, probably Sri Lanka and a number of Caribbean areas.

35. Analogous indications are found from crude death rates (recalling that these are much more useful for comparisons over time in the same nation than for cross-sectional comparisons over space). Within the upper-income group, nearly all areas showing changes of 3 per 1,000 or more throughout the interwar period or between the late pre-war and early post-war periods are from Eastern and Southern Europe, in addition to Japan. Indeed, as a result of age composition and decelerating downtrends in age-specific mortality, many developed country areas show increasing or at best constant crude death rates between the early 1950s and 1970. The only countries or areas with downward shift exceeding 2 per 1,000 between about 1950 and a post-1968 year are Japan, Poland, Puerto Rico, Romania and Yugoslavia.

36. Interwar trends among the lower-income countries appear to have been varied, substantial downtrends being intermixed with slight or no downward movements. Between the pre-war and post-war decades, however, an enormous acceleration of trends is found among populations of less developed countries on all continents. Most declines between 1935-1939 and 1950-1954 exceeded 5 per 1,000 and many were well above this amount. Moreover, such has been the extraordinary momentum of the post-war trends in the less developed regions that the majority of reliably recorded changes since the early 1950s have been in excess of 3 to 5 per 1,000, even though these had been preceded by similar or greater declines.

37. The startling sweep and scope of the recent trends in less developed countries should be further seen in historical perspective. Among the countries of Western, Northern and Central Europe, the leaders of the world's modern mortality transitions, annual gains in expectation of life at birth have only rarely exceeded one-half year at any time since 1850 (hence, *a fortiori*, at any time in history). Yet, as just noted, such gains rank at the low end of the range of recent gains registered in many parts of Latin America and Asia.

38. Similarly, for crude death rates, the declines in less developed countries cited above can be contrasted with the fact that the maximum 20-year declines found historically among countries with the world's lowest mortality have rarely exceeded from 5 to 6 per 1,000. Nineteenth-century declines of death rates among such countries typically fell far below this pace.

39. The comparative patterns just mentioned tend also to be replicated when the over-all trends are disaggregated by age, as documented below.

40. Within upper-income regions, the striking homogeneity of recent infant mortality rates, along with the vastly larger ranges of such rates during the interwar period, again suggests the more rapid pace of declines among the countries with initial higher mortality. Thus, Sweden, with one of the lowest rates for 1920-1924 and the lowest documented recently, experienced a decline from 61 to 11 per 1,000 births; similarly, Norway moved from 53 to 13. In contrast, Japan has witnessed a decline from 165 to 12 over the same period, while six countries in Eastern or Southern Europe, with rates at first extending from about 130 to over 200 (Bulgaria, Czechoslovakia, Hungary, Italy, Romania and Yugoslavia) have recently come to occupy a range of

[10] See G. J. Stolnitz, "A century of international mortality trends: I", *Population Studies*, vol. IX, No. 1 (July 1955), pp. 24-55, tables 2 and 6; and "Comparisons between some recent mortality trends in underdeveloped areas and historical trends in the West", in *Proceedings of 1955 Annual Conference* (Milbank Memorial Fund, 1956).

about 20 to 50 Similarly, Puerto Rico, Poland, Spain and the Union of Soviet Socialist Republics moved from a reported range of about 125-170 to one of 15-30 between the late 1930s and 1970

41. The infant mortality declines in developed countries were substantial in nearly every case during the interwar period and in every case between the late 1930s and early 1950s They have invariably, moreover, continued to decline since 1950 In this respect, the trends have been must more persistent than the over-all trends or those for later ages

42. Among lower-income regions, there is little evidence to judge infant mortality trends during the interwar period and what can be found is mixed On the other hand, the tendency to pronounced declines in more recent decades is apparent If one accepts the available, relatively reliable data as approximating a fair range of reality in less developed countries, and notes further the great range of social, medical and physical circumstances involved, two significant corollaries seem indicated First, changes of a high order of magnitude may well have taken place in many other parts of Latin America and Asia, as well as among some populations of Africa, for which statistical evidence is lacking Secondly, the range of recent rates in less developed countries is still centred about so high an average that further substantial declines appear likely in many individual areas, both documented and undocumented

43. Using changes in life expectancy at age 30 as a summary of trends in the higher adult ages, one again finds that the wealthier countries within the higher-income group tend to show lesser trends over the entire interwar-to-present period, while also showing a more frequent tendency to level off since about 1950, than does the "lower half" of the developed country group Once again, the limited number of less developed areas on record show increases which often match or exceed the largest gains in developed countries

44 Both of these generalizations appear to entail a greater number of exceptions than in the case of life expectancy at birth, possibly because of the greater weight of measurement errors For this reason, comparisons between developed and less developed countries of measures available for age 60 would seem more likely to be misleading than revealing

Stability of trend directions

45 Recorded mortality trends in the modern era have been noteworthy both for the absence of any long-term reversals of trend and for the infrequency of short-run upward fluctuations in times of peace. This has been universally the case for well over a century in the case of life expectancy at birth, for which nearly all declines on record have been trivial or short-lived. Israel, since 1960, comes closest to being an exception and even here the year-to-year fluctuations have ranged within a small interval, about one year of life In the case of crude death rates, the substantially higher levels before 1940 compared with 1950-1970 are apparent wherever documented The increases to be found in many higher-income countries since the early 1960s undoubtedly reflect shifts in age structure caused by declining fertility, rather than rising mortality proper

46 Infant mortality rates are especially helpful in this connexion These rates show persistent patterns of decline in every country, but the only apparent exception —Greece during the interwar period—is very probably the outcome of faulty measurement Such rates, as noted earlier, are independent of age composition shifts.

47 However, a perhaps historically novel pattern may be emerging in developed regions, one in which the direction of change in mortality at later ages has to be distinguished according to sex For females in developed countries, upper-age longevity has continued to mount steadily nearly everywhere, as has been the case for many decades In contrast, for males, upper-age life expectancy in many upper-income areas has either failed to increase during the past decade or two, tending rather to move sideways or in a plateau-like fashion, or to give signs of reversing trend In Israel, the Netherlands and Norway, there have been declines which, though still small, amount to several percentage points, with noteworthy decreases at both ages 30 and 60 Smaller downward movements in the age-30 measures, which may or may not prove to be random, are found in a number of other cases Israel shows declines for each sex at both 30 and 60, the only such instance

48 These facts mark a notable break with past uniformities, whatever the trends ahead The recent upward shift of upper-age longevity among some high-income male populations is perhaps the first or at least main such occurrence (for either sex) in recorded demographic history over the past century [11]

49 Among lower-income countries, at least as documented, the direction of change has been remarkably uniform Practically all available measures of life expectancy move in an upward direction, nearly all of the crude death rates move downward, and most if not all of the apparent exceptions could be the result of errors in measurement. Such uniformity is the more remarkable when account is taken of the vulnerability of low-income areas to natural calamities, economic setbacks and strains on their health management capabilities. Whatever the variability of directional changes on a year-to-year basis, they have tended quickly to be ironed out over periods as short as quinquennial intervals

World-wide thrusts to convergence

50 Events of the past two decades have launched or essentially completed enormously rapid processes of compression in regional mortality differences.

51. In Eastern and Southern Europe, death rates and longevity prospects today are less distinguishable from

[11] The stark rise of world-wide mortality in 1918 subsided quickly, as did the upsurge in post-war mortality [illegible] by a number of countries, such as [illegible] in 1945 1946

TABLE 2. EXPECTATION OF LIFE AT AGES 0, 30 AND 60, BY SEX: COUNTRIES OR AREAS CLASSED BY *per capita* INCOME STATUS; EARLIER TWENTIETH CENTURY AND RECENT DECADES

Region and country or area	Life-table periods	Earlier		1945-1954		1955-1964		1965 ff.	
		Male	Female	Male	Female	Male	Female	Male	Female
A. Age 0									
I. Higher *per capita* income									
Africa									
South Africa (Eur.)	1925-1927, 1950-1952, 1959-1961	57.8	61.5	64.6	70.1	64.7	71.7	...	...
Southern Rhodesia (Eur.)	1935-1937, 1961-1963	58.5	62.6	...	...	66.9	74.0	...	...
North America									
Canada	1930-1932, 1950-1952, 1960-1962, 1965-1967	60.0	62.1	66.3	70.8	68.4	74.2	68.8	75.2
Puerto Rico	1919-1921, 1949-1951, 1959-1961	38.2	38.8	59.4	62.4	67.1	71.9	...	...
United States of America	1919-1921, 1949-1951, 1960, 1968	55.5	57.4	65.5	71.0	66.6	73.1	66.6	74.0
South America									
Argentina	1914, 1947, 1959-1961, 1965-1970	45.2	47.5	56.9	61.4	63.1	68.9	64.1	70.2
Asia									
Israel	1950, 1960, 1970	...	...	66.3	69.5	70.7	73.5	69.6	73.0
Japan	1921-1925, 1949-1950, 1960, 1968	42.1	43.2	56.2	59.6	65.3	70.2	69.0	74.3
Europe									
Austria	1930-1933, 1949-1951, 1959-1961, 1970	54.5	58.5	61.9	67.0	65.6	72.0	66.3	73.5
Belgium	1928-1932, 1946-1949, 1959-1963	56.0	59.8	62.0	67.3	67.7	73.5	...	...
Bulgaria	1925-1928, 1960-1962, 1965-1967	45.9	46.6	...	...	67.8	71.4	68.8	72.7
Czechoslovakia	1929-1932, 1949-1951, 1960-1961, 1966	51.9	55.2	60.9	65.5	67.6	73.1	67.3	73.6
Denmark	1921-1925, 1951-1955, 1962-1963, 1968-1969	60.3	61.9	69.8	72.6	70.3	74.4	70.7	75.6
Finland	1921-1930, 1951-1955, 1961-1965	50.7	55.1	63.4	69.8	65.4	72.6	...	...
France	1920-1923, 1950-1951, 1960, 1969	52.2	56.1	63.6	69.3	67.2	73.8	67.6	75.3
German Democratic Republic	1924-1926, 1952-1953, 1960-1961, 1967-1968	56.0[a]	58.8[a]	65.1	69.1	67.3	72.2	69.2	74.4
Germany, Federal Republic of	1924-1926, 1949-1951, 1960-1962, 1966-1968	56.0[a]	58.8[a]	64.6	68.5	66.8	72.3	67.6	73.6
Greece	1926-1930,[b] 1960-1962	45.0	47.5	...	...	67.5	70.7	...	...
Hungary	1930-1931, 1948-1949, 1959-1960, 1968	48.3	51.3	58.8	63.2	65.2	69.6	66.6	71.9
Iceland	1921-1930, 1941-1950, 1951-1960	56.2	61.0	66.1	70.3	70.7	75.0	...	...
Ireland	1925-1927, 1950-1952, 1960-1962	57.4	57.9	64.5	67.1	68.1	71.9	...	...
Italy	1921-1922, 1950-1953, 1964-1967	49.3	50.8	63.8	67.2	...	...	67.9	73.4
Netherlands	1921-1930, 1950-1952, 1961-1965, 1970	61.9	63.5	70.6	72.9	71.1	75.9	70.7	76.5
Northern Ireland	1925-1927, 1950-1952, 1959-1961, 1968-1970	55.4	56.1	65.5	68.8	67.4	72.1	67.9	73.4
Norway	1921/1922-1930/1931, 1951-1955, 1961-1965	61.0	63.8	71.1	74.7	71.0	76.0	...	...
Poland	1931-1932, 1952-1953, 1960-1961, 1965-1966	48.2	51.4	58.6	64.2	64.8	70.5	66.8	72.8
Romania	1932, 1961, 1968	... 42.0[c]	...	...	...	64.2	67.7	65.5	69.8
Scotland	1920-1922, 1950, 1960, 1968-1970	53.1	56.4	64.5	68.3	66.4	71.9	66.9	73.1
Spain	1920, 1950, 1960	40.3	42.0	58.8	63.5	67.3	71.9	...	...
Sweden	1921-1930, 1946-1950, 1956-1960, 1967	61.0	63.2	69.0	71.6	71.2	74.7	71.8	76.5
Switzerland	1920-1921, 1948-1953, 1958-1963	54.5	57.7	66.4	70.9	68.7	74.1	...	...
Yugoslavia	1931-1933, 1952-1954, 1960-1961, 1967-1968	50.1	54.2	56.9	59.3	62.2	65.3	64.3	68.8
Oceania									
Australia	1920-1922, 1946-1948, 1960-1962	59.2	63.3	66.1	70.6	67.9	74.2	...	...
New Zealand	1925-1927, 1950-1952, 1960-1962	64.0	66.6	67.2	71.3	68.4	73.8	...	...
USSR	1926-1927, 1958-1959, 1968-1969	41.9[d]	46.8[d]	...	...	64.4	71.7	65.0	74.0

II Lower *per capita* income

Africa									
Mauritius	*1942-1946, 1951-1952, 1961-1963*	32 2	33 8	49 8	52 3	58 7	61 9	.	. .
South Africa (Asian)	1945-1947, 1959-1961	. .	.	50.7	49 8	57 7	59 6	. . .	.
South Africa (Coloured)	*1935-1937, 1950-1952, 1959-1961*	40 2	40 9	44 8	47 8	49 6	54 3	.	. .
North America									
Barbados	1945-1947, 1959-1961, 1964-1966	.	. .	49 2	52 9	62.7	67 4	67 2	71.4
Costa Rica	1949-1951, *1962-1964, 1965-1970*	. . .	. ;	54 6	57 0	61 9	64 8	65 0	67 2
El Salvador	1949-1951, 1960-1961, 1965-1970	.	.	49 9	52 4	56 6	60 4	53 2	58 0
Guadeloupe and Martinique	1951-1955, 1959-1963, 1963-1967	. . .	.	55 4	59 2	62 5	66 5	63 3	67 4
Guatemala	1949-1951, 1963-1965, 1965-1970		. .	43 8	43 5	48 3	49 7	50 3	56.6
Jamaica	1920-1922, 1950-1952, 1959-1961, 1964-1966	35 9	38 2	55 7	58.9	62 6	66 6	64 9	69 3
Leeward Isles	*1946, 1959-1961*	.	. .	49 5	54 8	58 0	61 9	.	. .
Mexico	1925, 1945, 1956, 1965-1970	31 0	33 2	43 8	44.6	55 1	57 9	61 0	63.7
Trinidad and Tobago	1920-1922, 1952, *1959-1961, 1964-1966*	37 6	40 1	56 3	58 4	62 2	66 3	63 8	67 6
South America									
Chile	1930, 1952, 1960-1961, 1965-1970	40 4	41 0	49 8	53 9	54 4	59 9	58 7	61 8
Guyana	1920-1922, 1950-1952, 1959-1961	33 5	35 8	53 2	56 3	59 0	63 0		.
Asia									
Cyprus	1931-1946, 1948-1950	57 3	59.3	63 6	68 8		.	. .	
Hong Kong	1961, 1968	. . .	.	.		63 6	70 5	66 7	73 3
Japan (Ryukyu Is)	*1926-1930, 1960*	46 0	50.5	.		68 0	74 6	. .	.
Malaysia (West)	1956-1958, 1969	. . .	. .	.	.	55 8	58 2	63 8	66 7
Sri Lanka	*1920-1922, 1950, 1962*	32 7	30.7	56 4	54 8	61 9	61 4	. .	. . .
Europe									
Albania	1955-1956, 1965-1966	.	.	.		57 2	58 6	64 9	67 0
Malta	*1946-1948, 1959-1961, 1968-1970*	. . .		55 7	57.7	66 8	70 9	68 4	72 6
Portugal	1939-1942, 1949-1952, 1959-1962, 1970	48 6	52 8	55 5	60 5	60 7	66 4	65 3	71 0

B Age 30

I Higher per capita income

frica									
th Africa (Eur)	*1925-1927, 1950-1952, 1959-1961*	37.9	40 8	39 6	44 1	39.1	44 8	. .	. .
rn Rhodesia (Eur)	1935-1937, 1961-1963	37.2	40 4	.	. .	40 3	46 7	. . .	. .
erica									
	1930-1932, 1950-1952, 1960-1962, 1965-1967	40 6	41 4	41 6	44 9	42 2	47 0	42 3	47 7
Rico	1919-1921, 1949-1951, 1959-1961	30 4	31 4	39 9	42 8	43 2	47 0	. . .	. . .
States of America	1919-1921, 1949-1951, 1960, 1968	37.3	38 2	39 8	44 3	40 4	45 9	40 2	46 4
rica									
a.	*1914, 1947*	32 6	35 0	36 9	41.1	. . .	.	. .	. . .
ael									
Japan	*1950, 1960, 1970*			42 7	44 8	44 4	46 5	43.3	45 5
	1921-1925, 1949-1950, 1960, 1968	32 6	34 7	36 7	*40 0*	*40 1*	*44 1*	*41.8*	46 3

TABLE 2 (continued)

Region and country or area	Life-table periods	Earlier		1945-1954		1955-1964		1965 ff.	
		Male	Female	Male	Female	Male	Female	Male	Female
Europe									
Austria	1930-1933, 1949-1951, 1959-1961, 1970	36.9	39.6	39.7	43.4	40.5	45.6	40.2	46.1
Belgium	1928-1932, 1946-1949, 1959-1963	37.8	40.2	39.3	43.2	40.9	45.9	...	...
Bulgaria	1925-1927, 1960-1962, 1965-1967	38.4	39.9	...	...	43.0	45.6	43.1	46.0
Czechoslovakia	1929-1932, 1949-1951, 1960-1961, 1966	37.2	39.2	39.6	43.0	41.2	45.6	40.9	46.0
Denmark	1921-1925, 1951-1955, 1962-1963, 1968-1969	40.8	40.8	43.6	45.3	43.3	46.5	43.3	47.4
England and Wales	1920-1922, 1950, 1960, 1968-1970	37.4	40.3	40.5	44.6	41.3	46.4	41.2	46.8
Finland	1921-1930, 1951-1955, 1961-1965	35.1	38.7	38.0	43.4	38.5	44.7	...	...
France	1920-1923, 1950-1951, 1960, 1969	35.5	38.7	39.3	44.1	40.5	46.4	40.5	47.3
German Democratic Republic	1924-1926, 1952-1953, 1960-1961, 1966-1968	38.6 [a]	39.8 [a]	41.5	44.2	41.8	45.5	42.5	46.7
Germany, Federal Republic of	1924-1926, 1949-1951, 1960-1962, 1966-1968	38.6 [a]	39.8 [a]	41.3	43.9	41.1	45.5	41.0	46.0
Greece	1926-1930, [b] 1960-1962	36.3	39.3	...	...	43.4	46.2	...	...
Hungary	1930-1931, 1948-1949, 1959-1960, 1968	36.0	38.3	39.6	42.7	40.9	44.2	40.9	45.2
Iceland	1921-1930, 1941-1950, 1951-1960	37.6	41.3	42.4	45.3	44.3	47.4	...	...
Ireland	1925-1927, 1950-1952, 1960-1962	38.4	38.6	40.2	42.2	41.7	44.6	...	...
Italy	1921-1922, 1950-1953, 1964-1967	37.6	38.4	41.2	44.0	...	...	42.1	46.8
Netherlands	1921-1930, 1950-1952, 1961-1965, 1970	41.0	41.1	44.3	45.7	43.8	47.7	43.2	48.1
Northern Ireland	1925-1927, 1950-1952, 1959-1961, 1968-1970	37.5	37.4	40.4	42.9	40.8	44.7	40.9	45.7
Norway	1921/1922-1930/1931, 1951-1955, 1961-1965	40.4	42.1	44.8	47.3	43.9	47.9	...	...
Poland	1931-1932, 1952-1953, 1960-1961, 1965-1966	36.0	38.0	38.9	43.0	41.1	45.5	41.7	46.5
Scotland	1920-1922, 1950, 1960, 1968-1970	36.5	38.6	39.4	42.7	39.8	44.5	39.8	45.2
Spain	1920, 1950, 1960	33.7	35.8	39.1	43.3	42.0	45.8	...	...
Sweden	1921-1930, 1946-1950, 1956-1960, 1967	40.6	41.6	43.0	44.6	44.0	46.4	44.0	48.1
Switzerland	1920-1921, 1948-1953, 1958-1963	35.6	37.8	41.0	44.4	42.2	46.5	...	...
Yugoslavia	1931-1933, 1952-1954, 1960-1961, 1967-1968	36.5	38.4	39.4	41.6	41.0	43.9	40.5	44.8
Oceania									
Australia	1920-1922, 1946-1948, 1960-1962	38.4	41.5	40.4	44.1	41.1	46.5	...	...
New Zealand	1925-1927, 1950-1952, 1960-1962	40.2	42.2	41.6	44.7	41.8	46.2	...	...
USSR	1926-1927, 1958-1959, 1968-1969	35.6 [d]	39.8 [d]	...	...	40.7	47.1	...	...
II. Lower *per capita* income									
Africa									
Mauritius	1942-1946, 1951-1953, 1961-1963	22.3	26.1	31.6	36.2	36.5	40.3	...	...
South Africa (Asian)	1945-1947, 1959-1961	...	...	32.7	32.1	35.4	36.9	...	...
South Africa (Coloured)	1935-1937, 1950-1952, 1959-1961	32.1	33.4	32.3	36.2	34.8	38.7	...	...
North America									
Barbados	1945-1947, 1959-1961	...	...	34.2	38.5	40.4	44.4	...	...
Costa Rica	1949-1951, 1962-1964	...	...	38.0	39.4	42.1	43.7	...	...
El Salvador	1949-1951, 1960-1961	...	...	37.4	38.8	40.1	42.5	...	...
Guadeloupe and Martinique	1951-1955, 1959-1963, 1963-1967	...	...	34.2	37.9	38.9	42.2	...	...
Guatemala	1949-1951, 1963-1965	...	...	33.9	33.4	35.3	36.9	39.2	42.6
Jamaica	1920-1922, 1950-1952, 1959-1961	28.3	31.7	36.9	39.7	40.2	43.4	...	...
Leeward Isles	1946, 1959-1961	...	...	33.2	37.8	39.0	41.4	...	...
Mexico	1925, [b] 1945, [b] 1956	30.5	31.1	33.4	35.3	38.1	40.8	...	...
Trinidad and Tobago	1920-1922, 1952, 1959-1961	25.8	29.1	35.4	37.7	38.0	41.3	...	...

South America									
Chile	1930, 1952, 1960-1961	33 7	37.1	34 8	39 2	37 0	41 6	.	..
Guyana	1920-1922, 1950-1952, 1959-1961	22 8	26 8	33.0	36 2	36 2	39 7	.	...
Asia									
Cyprus	1931-1946, 1948-1950	39 3	38 9	41 8	46 4	.	.	..	..
Hong Kong	1961, 1968	..	.	.		38 7	45 4	41.0	47 4
Malaysia (West)	1956-1958, 1969	.	. .	. .	..	36 4	38 7	40 3	42 5
Sri Lanka	1920-1922, 1950, 1962	28 4	27 6	40 0	39 5	40 0	39 8	.	. .
Europe									
Albania	1955-1956, 1965-1966	...			...	41 7	45 2	43.9	47 1
Malta	1946-1948, 1959-1961, 1968-1970	...		39 7	40 7	40 5	43 8	41 4	44 8
Portugal	1939-1942, 1949-1952, 1959-1962, 1970	36 0	40 4	38 6	43 2	40 7	45.4	42 0	46 7

C. Age 60

I Higher *per capita* income

Africa									
South Africa (Eur.)	1925-1927, 1950-1952, 1959-1961	15 3	16 8	15 5	18 4	15 0	18 6		...
Southern Rhodesia (Eur)	1935-1937, 1961-1963	14.5	16 4		..	14 9	19 9		...
North America									
Canada	1930-1932, 1950-1952, 1960-1962, 1965-1967	16 3	17 2	16 5	18 6	16 7	19 9	16 8	20 6
Puerto Rico	1919-1921, 1949-1951, 1959-1961	14 0	15 8	17 4	19 8	18 6	21 0	.	. .
United States of America	1919-1921, 1949-1951, 1960, 1968	15 2	15 9	15 7	18 5	15 8	19 5	15 7	20 0
South America									
Argentina	1914, 1947, 1959-1961	12 9	14 8	13 8	16 5	15 9	19 4	..	..
Asia									
Israel	1950, 1960, 1970			16 6	18 2	17 8	19 5	17 0	18 4
[illegible]	1921-1925, 1949-1950, 1960, 1968	11 9	14 1	14 1	16 4	14 8	17 8	15 9	19 2
[illegible]									
Austria	1930-1933, 1949-1951, 1959-1961, 1970	14 2	15 4	15 1	17 3	15 2	18 7	14 8	18 9
[illegible]	1928-1932, 1946-1949, 1959-1963	14 5	15 9	15 4	17 4	15 5	18 7		
[illegible]	1925-1928, 1960-1962, 1965-1967	16 4	17 2			16 9	18 5	16 8	18 6
[illegible]	1929 1932, 1949-1951, 1960-1961, 1966	14 4	15 4	15 2	17 0	15 5	18 4	15 3	18 6
[illegible]	1921 1925, 1951 1955, 1962-1963, 1968-1969	16 0	16 5	17 4	18 4	17 0	19 3	17 0	2 2
[illegible]	[illegible] 1922, 1950, 1960, 1968-1970	14 4	16 2	15 1	18 1	15 3	19 2	15 1	19.7
[illegible]	[illegible], 1951 1955, 1961-1965	14 0	15 8	14 1	16 9	14.3	17.5		
[illegible]	[illegible] 1951, 1960, 1969	13 8	15 6	15 1	18 1	15 6	19 5	15 5	20 3
[illegible]	[illegible], 1960-1961, 1967-1968	14 6*	15 5*	16 0	17 8	16 0	18 5	16 4	19 6
[illegible]	[illegible], 1960 1962, 1966-1968	14 6*	15 5*	16 2	17 5	15 4	18 4	15 3	18 9
[illegible]	[illegible]	14 9	17 3			17 0	18 8		
[illegible]	[illegible], 1968	13 5	15 0	15 8	17 3	15 3	17 4	15 3	18 0
[illegible]	[illegible]	16 0	18 3	18 2	19 6	18 6	20 4		.
[illegible]	[illegible]	14 5	14 8	16 0	17 5			16 4	19 5
[illegible]	[illegible]	15 9	16 4	17 8	18 6	17 4	20 1	16 8	20 5
[illegible]	[illegible]	14 8	15 6	15 3	17 0	15 1	17 9	15 1	18 8
[illegible]	[illegible]	17 0	18 2	18 5	19 9	17 6	20 1	.	.
[illegible]	[illegible]	13 7	15 1	14.7	17 3	15 8	18 6	16 1	19 3
[illegible]	[illegible]	...	...	.		15 3	17 0	16 3	18 2
[illegible]	[illegible] 1968 1970	13 8	15 6	14 8	17 0	14 5	17 8	14 5	18 6

TABLE 2 (*continued*)

Region and country or area	Life-table periods	Earlier		1945-1954		1955-1964		1965 ff.	
		Male	Female	Male	Female	Male	Female	Male	Female
Spain	1920, 1950, 1960	12.6	13.8	15.2	17.7	16.3	18.8	...	...
Sweden	1921-1930, 1946-1950, 1956-1960, 1967	16.6	17.4	17.0	18.0	17.5	19.2	17.6	20.4
Switzerland	1920-1921, 1948-1953, 1958-1963	13.3	14.4	15.7	17.8	16.2	19.2	...	...
Yugoslavia	1931-1933, 1952-1954, 1960-1961, 1967-1968	14.4	14.9	14.9	16.4	15.4	17.4	14.8	17.8
Oceania									
Australia	1920-1922, 1946-1948, 1960-1962	15.1	17.2	15.4	18.1	15.6	19.5	...	...
New Zealand	1925-1927, 1950-1952, 1960-1962	15.8	17.2	16.1	18.4	16.0	19.3	...	...
USSR	1926-1927, 1958-1959	14.8[d]	17.1[d]	...	...	17.0	20.6	...	...
II. Lower *per capita* income									
Africa									
Mauritius	1942-1946, 1951-1953, 1961-1963	8.1	10.6	11.2	14.6	13.2	15.8	...	...
South Africa (Asian)	1945-1947, 1959-1961	...	—	12.0	12.0	12.5	12.4	...	...
South Africa (Coloured)	1935-1937, 1950-1952, 1959-1961	14.1	15.1	13.6	15.8	13.8	15.9	...	...
North America									
Barbados	1945-1947, 1959-1961	...	—	13.2	15.8	15.5	19.0	...	...
Costa Rica	1949-1951, 1962-1964	...	—	14.8	15.8	17.0	18.2	...	...
El Salvador	1949-1951, 1960-1961	...	—	16.9	17.4	17.5	18.9	...	...
Guadeloupe and Martinique	1951-1955, 1959-1963, 1963-1967	...	—	13.8	16.5	15.9	18.5	15.8	18.7
Guatemala	1949-1951, 1963-1965	...	...	14.7	14.3	14.8	14.7	...	...
Jamaica	1920-1922, 1950-1952, 1959-1961	12.3	14.0	14.3	16.5	15.9	18.2	...	...
Mexico	1925,[b] 1945,[b] 1956	12.6	12.5	14.3	14.6	16.6	17.4	...	...
Trinidad and Tobago	1920-1925, 1952, 1959-1961	9.9	11.8	13.0	15.2	13.9	16.8	...	...
South America									
Chile	1930, 1952, 1960-1961	14.7	15.8	14.0	16.4	15.2	17.7	...	...
Guyana	1920-1922, 1950-1952, 1959-1961	9.4	11.4	11.4	14.2	13.2	16.2	...	...
Asia									
Cyprus	1931-1946, 1948-1950	14.6	15.9	16.9	19.5	...	...	...	...
Hong Kong	1961, 1968	...	...	...	...	14.0	19.1	15.6	20.6
Malaysia (West)	1956-1958, 1969	...	...	...	...	14.1	16.7	16.0	17.4
Sri Lanka	1920-1922, 1950, 1962	11.5	10.6	15.9	12.0	14.4	13.9	...	...
Europe									
Albania	1955-1956, 1965-1966	...	...	...	...	17.2	19.9	18.1	20.0
Malta	1946-1948, 1959-1961, 1968-1970	...	...	15.9	16.7	14.8	16.9	15.2	17.3
Portugal	1939-1942, 1949-1952, 1959-1961, 1970	13.9	16.2	15.1	17.7	15.7	18.6	16.2	19.2

SOURCE: *Demographic Yearbook, 1967* (United Nations publication, Sales No. E/F.68.XIII.1), table 29; *Demographic Yearbook, 1970* (United Nations publication, Sales No. E/F.71.XIII.1), table 20; *Demographic Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XIII.1), table 34; plus material furnished the author by Centro Latinoamericano de Demografía on estimated recent expectation of life at birth in a number of Latin American areas.

[a] Total pre-1945 Germany.

[b] Denotes questionable reliability. (The list should undoubtedly be much larger, especially for age 60.)

[c] Both sexes.

[d] European part.

those of Western Europe than at any previous point in modern times, and are practically the same as the average about a decade ago for the countries with the lowest mortality. The same is true of Japan and Puerto Rico. During much of the period 1900-1940, many of these same areas had lagged behind Western Europe by periods of from 25 to 50 years, or even longer.

52 The second great wave of twentieth-century convergence processes has involved the much larger numbers of countries and people in the lowest-income regions of the world Here, in country after country, populations have achieved longevity gains over the past two to three decades which the nineteenth-century leaders of mortality change first achieved over periods of from 50 to 100 years It is almost certain, moreover, that such gains have not been limited to the well-documented cases Comparably accelerated gains appear to have been achieved in a not small number of less well-documented areas, such as Brazil, Egypt and India, embracing a very large fraction of the total world population

53. Although recent gains may have been less marked in the many other less developed areas for *which it is hazardous or simply impossible to judge*, the likelihood is that some have moved swiftly out of the pre-modern range of mortality conditions to a point securely within the modern range. The sharply accel- [illegible]

some parts of that continent at least, though not necessarily to all.[12]

54. Although the contrast between populations in developed and less developed countries continues to be large *on average, and even vast in many individual* instances, there is probably no other major component of social conditions which has been witness to as much closing of the development gap as in the case of mortality

Differences by sex

55. Measures of life expectancy by sex provide convenient summaries of male-female differences in mortality (or survival) rates at individual ages [13] Use of such summaries leads to four especially noteworthy indications

56 In upper-income areas, female life expectancy has been universally higher than male longevity for a period now approaching a full half a century. The only exception shown among the cited data, for Northern Ireland in the 1920s (at age 30), is trivial in amount and the same degree of universality would undoubtedly be encountered if the comparisons were made at all ages rather than the few selected here. Such consistency is the more striking when contrasted with the not infrequent instances of higher male longevity found in these regions before the First World War.

57 A second pattern in developed regions, one of the most startlingly uniform long-term trends to be found anywhere in the social sciences, has been the stunning consistency with which female-male differences in longevity have been widening With practically no exception at any age or in any area in the past half a century, female expectation of life has tended to move upward more rapidly than male, so that today's longevity differences at birth are higher than at any time in recorded history (with the sole documented exception of Iceland) Much the same pattern, though with a few more occasional exceptions, holds at ages 30 and 60, as can be partially seen from the data in table 2 and could be demonstrated by a fuller review of the available life tables

58 Thirdly, and judging from very limited evidence, higher male longevity in less developed regions is by no means uncommon, though it may not be typical Although the large majority of male-female differences on record run in the opposite direction, the higher male levels found over a broad range of ages in Sri Lanka may well suggest the situation in considerable parts of Asia and the Middle East

59. Fourthly, although there is a widespread tendency towards more rapid increases of longevity among females in less developed regions, many more exceptions are found than in developed regions, especially at the adult ages To an unknown, but almost surely not small, extent, the surface evidence reflects statistical aberrations rather than empirical fact, if not with respect to amount of the male-female differences, then at least with respect to their trends

Changes by age

60. For many purposes, whether from the demographic or the health point of view, it is useful to examine both absolute and percentage changes in age-specific mortality rates, as well as the corresponding changes in life expectancy, as a function of age In addition, percentage changes in age-specific survival rates (their absolute differences being equal to those of mortality rates, though of opposite sign) are of basic importance for tracing the effects of mortality shifts on age composition

61 Each of these five types of age functions has been historically found to conform to one or a few modal patterns under situations of over-all mortality decline. Thus, percentage differences in mortality rates as well as absolute changes in life expectancy have tended almost uniformly to be downward sloping functions. Absolute changes in mortality rates and percentage changes in survival rates have often resembled reversed-J functions, having an upward-rising portion beyond about age 40 Lastly, percentage cha [illegible] life expectancy have tended to a [illegible] o or [illegible] in

[12] Other factors that could explain accelerated growth rates include rising fertility and improved enumeration

[13] Because of relatively large errors of measurement at the older ages, the accuracy of apparent trends tends to be inverse with age.

TABLE 3. CRUDE DEATH RATES AND INFANT MORTALITY RATES: COUNTRIES OR AREAS CLASSED BY *per capita* INCOME STATUS; EARLIER TWENTIETH CENTURY AND RECENT DECADES

Region and country or area	*Crude death rates*				Census 1969	*Infant mortality rates*				Census 1969
	1920-1924	*1935-1939*	*1950-1954*	*1960-1964*		*1920-1924*	*1935-1939*	*1950-1954*	*1960-1964*	
I. Higher *per capita* income										
Africa										
South Africa (Eur.)	10.1	9.8	8.6	8.9	8.1	78	56	34	30	19
Southern Rhodesia (Eur.)	9.5	9.6	6.5	6.3	7.1	68	46	27	19	19
North America										
Canada	11.9	9.9	8.7	7.7	7.3	94	69	37	27	18
Puerto Rico	...	19.0	9.0	6.9	6.5	...	123	64	45	28
United States of America	12.0	11.0	9.5	9.5	9.3	77	53	28	25	19
South America										
Argentina	14.0	11.5	8.8	8.5	...	116	98	65	61	...
Asia										
Israel	13.0	8.2	6.9	6.0	6.9	119	61	42	30	20
Japan	23.0	17.4	9.4	7.3	6.6	165	110	53	26	12
Europe										
Austria	16.7	13.9	12.3	12.5	12.6	142	86	56	33	25
Belgium	13.7	13.2	12.2	12.1	12.4	108	83	46	28	20
Bulgaria	21.3	13.9	10.2	8.2	9.8	157	146	94	38	26
Czechoslovakia	16.5	13.2	10.9	9.5	11.5	160	111	58	22	22
Denmark	11.4	10.7	9.0	9.7	9.8	82	64	29	20	14
England and Wales	12.3	12.0	11.6	11.8	12.1	77	55	28	21	17
Finland	15.6	13.3	9.7	9.2	9.6	98	68	35	20	11
France	17.3	15.7	12.7	11.2	10.6	97	71	46	26	13
German Democratic Republic	...	...	11.7	13.1	13.7	...	...	60	34	18
Germany, Federal Republic of	13.9	11.9	10.7	11.1	11.7	127	66	49	29	23
Greece	...	14.4	7.2	7.8	8.3	85	113	44	39	27
Hungary	20.9	14.3	11.4	10.1	11.4	192	136	74	44	33
Iceland	14.3	10.8	7.5	6.9	7.3	60	43	21	17	13
Ireland	14.6	14.3	12.6	11.8	10.6	72	70	42	28	20
Italy	17.5	13.9	9.9	9.8	9.6	129	103	61	40	28
Luxembourg	13.3	12.3	11.7	11.9	11.9	106	73	44	29	14
Netherlands	11.0	8.7	7.5	7.8	8.5	74	37	25	16	11
Northern Ireland	15.7	14.7	11.4	10.8	10.6	84	77	38	27	23
Norway	11.8	10.2	8.6	9.5	9.9	53	40	24	18	13
Poland	20.6	14.0	11.1	7.6	8.0	...	136	98	53	29
Romania	24.0	19.1	12.0	8.6	9.5	207	175	105	63	42
Scotland	14.0	13.2	12.2	12.1	12.5	92	76	35	26	20
Spain	21.0	17.9	10.2	8.8	8.2	...	124	62	42	16
Sweden	12.4	11.7	9.7	10.0	10.4	61	43	20	15	11
Switzerland	12.9	11.6	10.1	9.5	8.7	70	45	30	21	14
Yugoslavia	20.5	15.9	12.4	9.4	9.1	145	139	116	82	49
Oceania										
Australia	9.8	9.6	9.4	8.7	8.5	61	39	24	20	17
New Zealand	9.0	9.6	9.3	8.9	8.5	...	43	27	21	16
USSR	...	17.9	9.4	7.2	8.2	...	166	75	32	23
II. Lower *per capita* income										
Africa										
Cape Verde Isles	25.3	23.7	17.1	13.0	11.2	...	...	...	99	95
Mauritius	32.4	27.3	15.1	9.7	7.9	150	151	83	61	65
Réunion	...	...	18.1	11.1	7.7	...	...	139	80	43
South Africa (Asian)	...	...	9.6	7.5	7.0	...	...	64	60	38
South Africa (Coloured)	...	...	18.6	15.2	14.2	...	...	130	125	121
North America										
Bahamas	...	15.8	11.6	7.5	6.0	...	114	82	45	37
Barbados	30.2	20.6	13.2	9.2	8.7	...	210	131	62	29
Costa Rica	22.3	20.0	11.5	8.5	5.9	178	144	87	73	56
El Salvador	24.3	21.1	15.4	11.1	8.1	131	125	82	70	52
Guadeloupe	...	...	13.3	8.4	7.3	...	...	63	40	46
Guatemala	26.5	26.8	21.5	16.7	14.1	87	104	100	90	83
Jamaica	24.2	16.3	11.5	8.5	7.4	176	127	73	48	26
Martinique	...	...	12.6	8.5	6.6	...	...	58	43	28
Mexico	25.1	23.3	15.1	10.4	8.7	226	128	92	69	61
Trinidad and Tobago	22.3	16.6	11.3	7.3	6.8	141	104	75	41	35

TABLE 3 (continued)

Region and country or area	Crude death rates 1920-1924	1935-1939	1950-1954	1960-1964	Census 1969	Infant mortality rates 1920-1924	1935-1939	1950-1954	1960-1964	Census 1969
South America										
Chile	30 2	23 3	13 6	11.8	9 4	241	213	128	115	79
Guyana	28 5	21 8	13 4	8 5	7 6			79	52	40
Surinam	20 2	13 0	10 2	7 8	7 2	104	61	43	40	30
Asia										
Cyprus	*19 9*	*14 4*	*7 5*	6 0	*6 5*	*155*	*122*	*56*	29	25
Hong Kong		29 1	8 9	5 7	5 2			82	35	18
Japan (Ryukyu Is)		16 7	7 3	5 4	[illegible]			11	10	11
Malaysia (West)		20 8	14 0	9 0	7 0[a]		149	91	58	39[a]
Singapore	30 5	22 1	10 4	5 9	5 4	230	152	69	31	20
Sri Lanka	28 9	24 5	11 5	8 5	7 6	192	182	77	54	50
Europe										
Albania		17 1	14 3	9 8	7 5	62	97	108	85	87
Malta	23 2	20 3	10 1	8 7	9 1	266	234	79	35	17
Portugal	21 5	15 9	11 8	10 8	10 4	153	139	92	77	50

SOURCE *Demographic Yearbook, 1966* (United Nations publication, Sales No 67.XIII.1), tables 14 and 17, *Demographic Yearbook, 1971* (United Nations publication, Sales No E/F.72 XIII 1) tables 28 and 30, United Nations, *Population and Vital Statistics Reports, Data Available as of 1 April 1973*, Statistical Papers, Series A, vol XXV, No 2 (1973)

[a] For Malaysia (East and West)

patterns, resembling reversed-J, L-shaped or declining configurations.[14]

62 Clearly to be seen, even from the limited information being cited, is the pronounced tendency for absolute changes in life expectancy to decline with age in all regions, as has been true traditionally. Only Sri Lanka among recorded areas shows changes which *appear to rise significantly with age—between 30 and* 60—and this is not improbably the result of measurement errors more than of the facts Practically all of the remaining areas show monotonic declining changes.

63. At the same time, since the level of life expectancy is also a monotonic declining variable, percentage changes in life expectancy may take on varied patterns —declining, more or less constant, or in some cases rising.

64 With respect to changes in mortality or survival rates by age, at least one major indication can be deduced from the infant mortality rates shown in table 3. The low level of such rates found in nearly all developed countries in recent years, together with the fact that any further change possible (down to zero) would typically be much lower than actual changes over the past 20 to 40 years, may well have a dominant bearing on the entire shape of future age functions Such functions could become predominantly upward-moving with age rather than largely downward-sloping as in the past. If so, this could mark a diametric break with historical patterns, one whose implications for age composition are discussed in the following section

[14] For a review of the evidence to 1950 see G J. Stolnitz, "A century of international mortality trends II", *Population Studies*, vol X, No 1 (July 1956), pp 17-42, especially figure 8

SOME MAIN PROSPECTS AND IMPLICATIONS

Causal aspects

65 There are numerous reasons to believe that levels of living and life-styles have not been the exclusive or even the predominant determinants of recent world mortality trends and their differences by region This is not to deny that such factors as income, housing, nutrition, education, occupation or place of residence may have significant causal weight in determining level of mortality, its actual changes or its potential for further change The countries with lowest mortality still rank among the highest in income as a rule, those with high or highest mortality tend to rank lowest developmentally, and those intermediate in the one are usually intermediate in the other. Moreover, analogous mortality-income relationships are frequent at intra-national levels, for example, if one compares infant mortality by socio-economic class or similar categories.

[illegible]

cal resources, and sanitary facilities In areas where mortality is especially high, as in Africa and parts of Asia, public health and sanitation are almost surely the main prime movers needed for achieving rapid initial change. In less developed areas with already reduced, but still high mortality, hospital and other medical facilities have tended to become the strategic main factors for further change once public health and sanitary control subsystems have come into being. The same has been true of less developed areas which [illegible] to penetrate current or recent ranges of

veloped areas. In all of these cases, the onset of rapid changes, both in mortality and many major causes of death, is found to be closely related with programmes instituted by Governments, international agencies and other health-related institutions. The compression of mortality in developed countries has a similar interpretation.

67. It follows from this weighting of causal factors that the strategic elements underlying international mortality trends during recent decades have been twofold:

(*a*) The existence and rapid development of highly efficient (in both physical and economic terms) disease control technologies;

(*b*) The existence of sufficient political will and administrative capabilities (both nationally and internationally) to apply such technologies.

These, in explicit contrast with quality or quantity of nutrition, *per capita* income, education, housing or similar components of over-all levels of living, would appear to have played the essential roles as determinants of the observed trends in mortality (though not, of course, of its level) in developed and less developed countries.

68. Detailed justification of this conclusion would require an extended review of the trends in causes of death, as well as of specific disease control programmes, within individual areas. Since a much larger paper than the present one would be needed for this purpose alone, it will be enough to consider the mortality trends themselves as a way of delineating probable main causal forces.

69. Thus, the recent accordion-like convergence of longevity levels within the developed group of countries has occurred in the face of very substantial and continuing differences in levels and trends of *per capita* income, occupational structure, educational circumstances and over-all social-political systems. The more rapid trends among populations which were last to reach 65-70 year levels of expectation of life at birth, the contrastingly slower trends in the 70-and-over subgroup, and the typically marked deceleration of trend in both subgroups over the past decade, suggest—singly and in combination—that something like a technical ceiling has been reached, with more or less full utilization of medical technological possibilities by all areas within the group.

70. More spectacularly still, the great upsurge in longevity found among so many populations in less developed countries—in the face of vast economic and cultural differences, and despite the resistances posed by pronounced poverty syndromes—suggest an essentially technical triumph over environmental adversity. The very speed of the trends and their occurrence under such diverse geographical and social circumstances are both considerable presumptions against regarding the slower-moving forces of over-all development as the main causal elements. The specific timing and sudden appearance of major-scale trends can often be correlated closely with specific health control activities, with anti-malaria programmes the outstanding case among many. That urban mortality in less developed countries is so often found to be significantly lower than in rural levels (a pattern in marked contrast with the historical experience of many industrially advanced countries, such as the United States) provides telling further evidence in the same direction. Although many urban-rural differences confound the issue, it appears almost surely correct to place heavy weight in interpreting lower urban mortality on the greater availability and effectiveness of health-related facilities in urban compared with rural areas. Income-related or similar indicators of levels of living or welfare, though not absent, would seem to be of secondary weight.

Trend prospects

71. If the foregoing interpretation is approximately correct, it implies that over-all longevity in less developed countries can reach levels which go far beyond the experience of, say, 1940-1950. The extensive geographical spread and socio-economic variations of less developed areas which have achieved large-scale gains in mortality during the past two or three decades suggest that low-income areas everywhere or nearly everywhere could expect to attain at least a 50-55 year level of life expectancy at birth, assuming no more than existing medical technology and only realistically limited inputs of resources and funds. Moreover, to judge again from actual trends, such levels should be reached rapidly, in one to two decades, after appropriately designed disease-control systems become implemented. Possibly only some parts of Africa or such locations as the Amazon region in Brazil, where climatic or other physical-environmental conditions are extremely severe, may prove to be exceptions.

72. For the low-income countries that have already gone beyond the 50-55 range, by no means a small group today, a range of 55-65 years seems entirely attainable in the coming few decades and a less conservative range of 60-70 may be more appropriate in many instances. Indeed, the latter has already been achieved in parts of Latin America and Asia.

73. Probably the crucial determinants of trend in any specific area would be the current prevalence of major infectious diseases, the existing (or oncoming) technologies available for combating these, and the degree of intensity with which technically feasible programmes will continue to be implemented.

74. All of this, of course, ignores the possibility of reversals of trend, i.e., of rising mortality on a sustained basis. The facts in this regard (suggested by the well-documented trends available, by less reliable statistical indications and from non-statistical sources) point rather strongly against this possibility, at least in so far as shortfalls in food supply as such, rising urban densities or increased pollution are concerned. Rather, the most likely source of reversals would be in the political sphere, as in the event of anarchy, turbulence or administrative breakdown.

75. In the developed regions, again assuming no trend reversals, survival chances before the upper years of life have advanced to where mortality levels are close to numerical ceilings. As a ready approach to documenting this point, use may be made of the extreme assumption that no future individual in a developed country would die before age 60 Since current expectation of life at that age ranges up to about 18 years for males and 20 for females, the assumption would imply measures of life expectancy at birth which approximate 78 and 80 years, respectively. The former value would represent a further gain of some 10 years over recent national levels for males in developed countries and the latter a much smaller gain as a rule for females For both sexes, such maximum increases (with mortality beyond 60 held constant) would typically be below the increases experienced since as recently as the interwar period and would often fall short of such increases by considerable margins

76 Trends in developed countries in recent decades are again essentially not replicable in the important case of infant mortality. Every national rate recently has been far less than half the 1935-1939 level and many are less than half the rate found after the war In no case, therefore, can the declines between about 1940 and 1970 be matched by further downward movements, no matter how pronounced For two thirds of the developed country group, a much stronger analogous conclusion holds, in that the dating of non-repeatable trends can be traced to a period as recent as the early 1950s, only about 20 years ago.

77. Analogous ceiling effects throughout the childhood years up to fairly advanced ages explain the recent [illegible] e ex- [illegible] This [illegible] reinforced in the 1970s and beyond unless there are marked medical breakthroughs in the treatment of the old-age and degenerative diseases Assuming no future uptrends in mortality (which could permit subsequent downtrends), the tendency would hold both for females, for whom upper-age life expectancy has continued to rise, and for males, despite the recent small reversals encountered in some areas.

Effects on population growth rates

78. Mortality declines have long ceased to be numerically significant for the growth rates of the older industrialized countries and the same conclusion seems very likely to hold in future for all populations in developed countries (assuming as before no sharp or sustained reversals). Only the recent additions to the group, such as Japan, a number of Eastern European countries, Spain or Puerto Rico, show declines in the death rate since 1920 which have exceeded 10 per 1,000 and hence have added as much as one percentage point to annual growth rates. In contrast, practically all of the older and relatively wealthier developed countries show half-century declines not exceeding 5 per 1,000, thereby contributing less than one half of a percentage point to growth Today, with death rates in developed countries ranging from about 7 to 13 per 1,000, it is difficult to foresee a contribution exceeding the one-half point level and more plausible to expect much smaller numerical effects as a highly general rule. [15]

79. There is also little or no reason to expect that future mortality declines in developed countries could raise growth rates significantly in an indirect fashion, as by raising fertility Rather, it appears much more likely that the main indirect effects, such as improved health, reduced rates of family dissolution as a result of death of spouse, and reduced size of family desired for old-age security purposes, have long become imbedded in the social structure of populations accustomed to low vital rates

80 Only in relative or percentage terms might small direct or indirect effects have substantial weight on growth rates. In view of the low values of the latter in most upper-income regions, a decline of two to four points in the death rate would, in some developed country populations, cause a rise of well over one third in their growth

81 The effects of mortality declines on population growth in less developed regions are much more dynamic in a number of respects First, since interwar-to-recent declines in death rates in less developed countries have often entailed a drop from a level of from 20 to 30 per 1,000 down to about 10, their numerical contributions to growth have been about 1 5 per cent as a general order of magnitude The last is three times or more above the half-century contributions in most developed countries, indeed, it matches or exceeds the total size of the growth rates themselves found among the industrializing countries of Europe of the nineteenth century. In addition to higher fertility, therefore, recent contributions on the side of mortality go far to explain why current growth rates in less developed countries are so often double or triple the average rates of the industrializing countries of the nineteenth century and from 50 to 100 per cent above their maximum rates Presumably, similar growth contributions will also occur in less developed countries which have yet to experience a sustained mortality transition, or where—as apparently in Kenya—such transitions are occurring but cannot be documented.

82. Secondly, since crude death rates have become low over large parts of the world's less developed regions, often approximating those in developed regions, further declines can make only limited further contributions to growth rates in many individual less developed countries This is so whether one considers absolute amounts of contribution or, in view of the elevated growth rates involved, percentage effects.

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[15] Should current downtrends in fertility in developed countries continue, and therefore should average ag [illegible] population rise, the limitations on future po [illegible] clin [illegible] ge composition would reinforce those [illegible] m [illegible] roper.

83. Thirdly, the indirect possible effects of declining mortality on fertility may well be considerable. Those operating to increase fertility, through improved health and by raising the probabilities of unbroken families, may well help explain the apparent uptrends of fertility during the 1950s in a considerable number of less developed areas. A converse possibility, that increased survival chances of children may reduce the need for large families as a form of social security in traditional societies, has yet to be confirmed to be a sufficient offsetting factor. Judging from a succession of micro-studies among populations of less developed countries, it appears true that child loss and changing expectations concerning child survival have effects on fertility behaviour or attitudes which are in the expected direction. However, the quantitative dimensions of such effects need considerably more investigation than has been available up to now, as does the question of probable time lags between actual mortality trends and their perception from fertility viewpoints.[16]

84. Until now, at least so far as can be judged from macro-fertility indications, it would appear that the pro-natalist effects of mortality declines have been dominant over anti-natalist effects. However, the situation may be changing. The now mounting signs of sustained fertility declines in a growing number of populations in less developed countries throughout the world may be auguring a reversal of net mortality effects, from a fertility-enhancing to a fertility-depressing balance of forces.

Future sex differentials

85. For populations in developed countries, perhaps the main broad-scale question to be raised about longevity differences by sex is whether these will continue to rise with the same remarkable degree of consistency as has been observed in the past. The tendency in a number of developed countries to stagnating or even somewhat downward-trending values of male life expectancy at the adult ages would suggest that this may well be the case. On the other hand, the sharply enhanced secularization of female occupational roles and life-styles in societies of developed countries may prove to exercise an opposing or narrowing effect on differentials.

[16] For a valuable review of the literature on the subject, see World Health Organization, "Health trends and prospects in relation to population and development", *Population Debate*, vol. I, part four.

86. Among populations in less developed countries, at least so far as the small amount of information available can suggest, the pronounced modal tendency in recent decades for female-male differences to increase (i.e., to become more positive in most cases or less negative in such areas as Sri Lanka) seems likely to continue. The reasons for this assessment of prospects are partly statistical and partly by analogy with the developed areas as these experienced transitions over comparable ranges of mortality.

Age patterns of change

87. Although no data have been presented here on age functions of change in mortality or survival rates, the limited evidence available from successive life tables for populations of less developed countries gives good reason to expect that future modal patterns will continue to resemble those noted previously. For a long time to come, the largest amounts of change are likely to be at the infant ages, causing the appearance of reversed-J or similar configurations. In part for this reason and in part because percentage changes in survival rates tend to be numerically constrained, it can be expected that the effects on age composition will be limited and will tend to reduce average age rather than raise it.[17]

88. Among most populations in developed countries, in contrast, the sheer numerical limitation today on possible further declines in infant mortality has become such as to augur a break with the past. Should the age function of percentage changes in survival rates no longer be dominated by the infant survival rate, it could come to resemble a J-shaped, U-shaped or even reversed-L shaped pattern, with the effect of raising average age. The first and third of these possibilities, in turn, could also come to have increasing impact on the fraction of aged, roughly those 60 and over.[18]

89. Should these potential effects become actual, they would mark one of the least observed but more notable ways in which the future evolution of international mortality would break with earlier uniformities.

[17] This assumes unchanging age-specific fertility, as demonstrated in G. J. Stolnitz, "Mortality declines and age composition", *Milbank Memorial Quarterly*, April 1956.

[18] If percentage changes in age-specific survival rates continued to be monotonic, declining but largely negative, the effects would be much as in the past when the changes were reversed-J in pattern but positive.

INTERNATIONAL MIGRATION TRENDS, 1950-1970

United Nations Secretariat *

HISTORICAL BACKGROUND[1]

1 In relation to the mass movements of population over long sea routes which occurred during the latter part of the nineteenth century and the early decades of the twentieth century, recent international migrations have been on a much more modest scale. So far as European migrations are concerned, it has been estimated that from the beginning of colonization up to the time of the Second World War about 60 million Europeans had emigrated to oversea countries, nearly 60 per cent of them going to the United States of America, while Argentina, Canada, Brazil and Australia also received large numbers [2] This movement reached a peak in the decade and a half prior to the First World War, when it is estimated that more than 1 million persons annually left Europe for oversea destinations Restrictions on immigration imposed by the oversea countries of settlement and the depressed economic conditions of the 1930s greatly curtailed this movement.

2 Following the Second World War, there was again a large movement out of Europe, some of it constituting the resettlement of refugees abroad. According to figures compiled mainly by the International Labour Office, gross emigration from European countries overseas totalled roughly 7.5 million in the period from 1946 to 1959, thus averaging over 500,000 annually [3] By the 1960s, this movement had subsided, and total emigration from Europe during the decade was about 4 2 million, as is shown in the next section. While the flow of migrants from Europe to oversea destinations has diminished, other new migratory currents have developed which merit continuing study. These include a heavy volume of labour migration within Europe itself, where it has been estimated that towards the end of the 1960s the immigrant population of the countries of Northern and Western Europe numbered from 8 5 million to 9 million [4]

3. The migrations of non-Europeans are less well documented statistically It is known that within the past century large numbers of Indians, for example, emigrated to Burma, Malaysia and what is now Sri Lanka Indians also migrated outside the region as recruited or indentured labourers to Fiji, Guyana, Mauritius, South Africa and Trinidad and Tobago. Substantial numbers of Indians moved to East Africa as small traders, craftsmen and clerks, in addition to labourers

4 In recent decades, the largest international migrations of Asians have been refugee movements With the partition of Palestine in 1947, there was an exodus of some 700,000 Palestinian Arabs from the territory now constituting the State of Israel. A much larger transfer of population between India and Pakistan, involving over 7 million persons on each side, took place in the period immediately following partition These movements continued into the 1950s, and it has been estimated that well over 1 million more refugees moved in each direction between 1951 and [illegible] [5] More recently, another movement of huge magnitude occurred across international boundaries, when, as a result of the conflict in what was formerly known as East Pakistan, many Bengalis sought refuge in the neighbouring States of India In December 1971, when the movement reached its peak, it was said to have involved nearly 10 million persons, but the great majority [illegible] were [illegible] repatriated. [6] In another [illegible] resulting from this conflict, by late January [illegible] about [illegible] persons had been air-lifted from Pakistan to Bangladesh [illegible] 44,000 from Bangladesh to Pakistan [illegible]

5. Migration has been [illegible] of several countries [illegible] of relative [illegible] population size [illegible] total population [illegible] 1951 [illegible] elsewhere. In [illegible]

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* Population Division of the Department of Economic and Social Affairs

[1] This section represents a summary and updating of portions [illegible] The Determinants [illegible] vol [illegible], chap [illegible]

[2] D Kirk, *Europe's Population in the Interwar Years* (Princeton, New Jersey, Princeton University Press, 1946), pp 72-73; J Isaac, *Economics of Migration* (London, Paul Trench and Trubner, 1947), p 62

[3] International Labour Office, *International Migration 1945-1957*, Studies and reports, New series, No 54 (Geneva, 1959), p 165

[4] M Livi-[illegible] Population [illegible] 1971, [illegible]

[5] [illegible]

[6] [illegible]

[illegible]

numbered less than 500,000 in 1965, 60 per cent of the population had been born abroad. Israel is another predominantly immigrant country, having received migrants mainly from Europe, North Africa and other States in the Middle East.

6. While the migrations of Asians to the areas of European settlement had long been restricted by the countries of immigration, new currents developed in the recent period. Numerically, the largest movement has been that from the British Commonwealth countries of Asia to the United Kingdom of Great Britain and Northern Ireland, amounting to a net figure of more than 500,000 immigrants since 1950. With the removal of restrictions in the major immigration countries, particularly Canada and the United States, Asian immigrants began to appear in greater numbers after the mid-1960s. As the countries of immigration increasingly placed emphasis on requirements of skill rather than national origin for their migrants, there has developed an outflow of trained personnel from Asian countries which has become a cause of concern. Another migration stream worth noting is that from Japan to Brazil, which resulted in a Japanese settlement of about 250,000 by the close of the Second World War and which was resumed in the early 1950s. [8]

7. Since the abolition of slavery, migrations of Africans have been confined mainly to intra-continental movements. These migrations, concerning which reliable statistical data are lacking, have been associated with the search for better agricultural land and the attraction of wage labour in certain areas. In Central and East Africa, the main movements have been towards the south, particularly to the Republic of South Africa and Southern Rhodesia. In West Africa, Ghana has been a country of attraction; the 1960 census revealed that at the capital city, Accra, nearly one third of males aged 25-44 years had been born outside the country. Recently, movements across international boundaries have been reduced by the introduction of visa regulations and work permits in many African countries. [9]

8. Aside from the economically motivated migrations, there have been other large migrations across national boundaries in Africa. The Report of the United Nations High Commissioner for Refugees for 1973 showed that at the end of 1972 there were about 1 million refugees living outside their home countries in Africa. [10]

9. Though on a much smaller scale than intra-continental migration, there has been a movement of some significance from British Commonwealth countries in Africa into the United Kingdom in the past decade. Small, but increasing numbers of immigrants from Africa have been admitted to Canada and the United States in recent years.

10. Substantial migrations of Europeans to the African continent, dating from about the middle of the nineteenth century, brought the total European population of Africa to about 6 million by 1960. The European colonists settled mainly in the Republic of South Africa, in several countries of East Africa—notably Southern Rhodesia—and in North Africa. As mentioned earlier, sizable numbers of Indians settled in East Africa, and outnumbered by far the European population in such countries as Kenya, Uganda and the United Republic of Tanzania. Many Europeans left after some of these countries became independent, the largest repatriation being that of approximately 900,000 persons from Algeria to France in the early 1960s.

11. In the latter half of the nineteenth century, immigrants mainly from Southern Europe began to enter Latin America in large numbers, with an estimated 6.6 million going to Argentina up to 1940 and 4.7 million going to Brazil. [11] Migration to Latin America might have reached even greater dimensions than it did, particularly after limitations were imposed in the United States in the 1920s, had it not been for such factors as the system of land tenure which prevented settlers from obtaining cheap land, the low wages in cities and insufficient capital for industrial investment. While about 2 million persons are estimated to have migrated from Europe to Latin America between 1946 and 1960, [12] the annual numbers began declining in the mid-1950s and a strong return movement developed. At the same time the migration from Latin America to Northern America, particularly to the United States, was on the rise. There have been significant currents of international migration also within Latin America—for example, from Bolivia, Chile and Paraguay to Argentina, from Colombia to Venezuela and from El Salvador to Honduras. [13]

12. While other recent studies have dealt with migration flows, [14] the present study is concerned also with net migration, in order to assess the importance of migration as a component of population growth in different regions and countries. The main attention is given to the countries having the best statistical data, that is, those of Europe, Northern America, Australia and New Zealand. [15] Migration between these areas and

[8] H. D. Sims, "Japanese postwar migration to Brazil: an analysis of data presently available", *International Migration Review* (New York), vol. VI, No. 3 (Fall 1972), p. 246.

[9] W. T. S. Gould, "Background Paper: Africa", submitted to the Seminar on Demographic Research in Relation to International Migration, Buenos Aires, 5-11 March 1974.

[10] *Official Records of the General Assembly, Twenty-eighth Session, Supplement No. 12* (A/9012), para. 49.

[11] *Economic Survey of Latin America 1948* (United Nations publication, Sales No. 49.II.G.1), pp. 155-157.

[12] Compiled from statistics for the countries of emigration. See W. D. Borrie, "Trends and patterns in international migration since 1945" (B.9/14/E/474); table XII. Background paper prepared for United Nations World Population Conference, Belgrade, 30 August-10 September 1965.

[13] J. Morales-Vergara, *Panorama de la migración internacional entre países Latinoamericanos*, Serie A, No. 121 (Santiago, Chile, Centro Latinoamericano de Demografía), p. 42.

[14] See, for example, Intergovernmental Committee for European Migration, *Report on the Inquiry on National Policies and Trends of European Migration*, MC/1033 (Geneva, 1972).

[15] The Union of Soviet Socialist Republics is not included because the implied migration balance for that country was found to be negligible for the period studied.

the less developed regions is also examined, but the more difficult task of surveying migration trends within the developing regions of Africa, Asia and Latin America has had to be deferred for later study.

Major migratory movements since 1950

Traditional migration currents from Europe to overseas destinations

13. Table 1 gives the numbers of immigrants from Europe to the principal overseas areas of settlement during four quinquennial periods from 1951 to 1970 [16] The table shows that, during the 20 years under review, Europe continued its traditional role by sending out 9.5 million migrants to the overseas areas of settlement This figure presents a striking contrast with the European net migration loss, estimated at only about 3 million Not only did some of the emigrants return, but Europe also received substantial numbers of immigrants from other areas.

14 While the United States of America has retained its position as the leading immigration country in terms of the total intake of migrants from all regions, during the past two decades European migrants are seen to have gone in nearly equal numbers to the United States (2.5 million), Australia (2.4 million) and Canada (2.3 million) The table also shows some sharply divergent trends for the different receiving countries. While the volume of European migration to Australia and South Africa continued to rise in the 1960s as compared with the previous decade, the gross numbers emigrating from Europe to Northern America were somewhat reduced in the 1960s, particularly in the early part of the decade This pattern was especially marked for Canada and was associated with a levelling off in some areas of the economy in the early 1960s. [17]

[16] Except in the case of Latin America, the figures are those collected by the countries of immigration, since statistics of immigration are generally of better quality than statistics of emigration

15. One of the most striking features of European migration overseas has been the drastic curtailment of the traditional flow from Southern Europe to Latin America. Table 1 shows a steady decline in the number of migrants from the main sending countries in each of the time periods, the total for 1966-1970 being only about one sixth of that in 1951-1955 Of the migrants from Southern Europe to overseas destinations in the 1960s, more were drawn to the high-income countries of Northern America and Oceania than to Latin America The main explanation for the decreased movement to Latin America, however, lies in labour market conditions in Western Europe, where high wages and plentiful job opportunities in the 1960s proved to be a powerful attraction for migrants from Southern Europe The developments in Western Europe coincided with actions on the part of Governments of Latin American countries to reduce the inflow of workers without special skills. [18]

16 While Europe continued during the 1960s to send substantial numbers of migrants to Northern America and Oceania, though not to Latin America, in relation to the total number of immigrants received in these areas, the European component has shown a marked decline. In the United States, where Europeans constituted about half of all immigrants in the early 1950s, this proportion had fallen to under one third by the late 1960s In Canada, the proportion of Europeans among immigrants dropped from 88 per cent to 65 per cent during the same period and in Australia, from 88 per cent to 69 per cent. New immigration legislation adopted in each of these countries in the 1960s no doubt played a role in these changes

17. Of the Europeans migrating to the United States in the 1960s, persons from Italy, the United Kingdom and the Federal Republic of Germany made up the largest contingents, constituting about 214,000, 210,000

[17] *Canada Yearbook, 1970-1971* (Ottawa, Dominion Bureau of Statistics, 1971), p 265

[18] Intergovernmental Committee for European Migration, *op cit*, p 17

Table 1. Immigrants from Europe to principal oversea destinations, 1951-1970, based on statistics of receiving countries

(Thousands)

Country or region	Total 1951-1970	1951-1955	1956-1960	1961-1965	1966-1970
Total	9,478 6	2,791 6	2,504 0	1,876 6	2,306 4
Australia	2,391 6	513.1	524 9	588 8	764 8
New Zealand [a]	309 7	82.3	70 9	86 1	70 4
Canada	2,327 9	699 9	672 9	365 2	589 9
United States of America [b]	2,460 5	628 2	700 1	531 6	600 6
South Africa	341.9	68 4	45.2	78 6	149 7
Latin America [c]	1,647.0	799 7	490 0	226 3	131 0

[a] Years ending 31 March.
[b] Years ending 30 June
[c] From Italy, Portugal and Spain only, based on statistics of the Migrants from these three countries constituted about 95 per cent of all E to Latin America

and 191,000, respectively, in the decade. During the same period immigrants to Canada comprised about 340,000 from the United Kingdom and 194,000 from Italy. For each of these countries, the groups specified made up just over half of the total immigrants from Europe. Three fourths of the European immigrants to Australia came from three countries: the United Kingdom (740,000); Italy (157,000); and Greece (126,000).

18. While the statistics presented above may give a reasonably accurate picture of the migrations from Europe, it is more difficult to determine the number of migrants who have returned and the numbers born in other areas who have migrated to Europe. Canada keeps no statistics of emigration and the United States has kept no records of emigration since 1957.

19. Official estimates of emigration from the United States are quite low. The number of citizens and resident aliens who emigrated from the United States during the 1960s was estimated at 255,000. [19] Of this total, 158,000 went to Canada. It is clear that the estimated numbers emigrating to Europe, while not given separately, could amount to only a small fraction of the numbers arriving from that continent. However, the statistics of immigration collected by some Northern and Western European countries suggest that there is a considerable two-way migration with the United States and that return migration may well be higher than implied by the estimates of the United States. Estimates from the International Passenger Survey of the United Kingdom, for example, show that during the period 1966-1970, the number of Commonwealth citizens emigrating to the United Kingdom from the United States was 41 per cent of the number emigrating to the United States.

20. In Australia, where statistics are collected on emigration as well as on immigration, return rates have been considerable and have shown a rising trend. This probably reflects the prosperous economic conditions prevailing in Europe in the 1960s. [20] For the period 1947-1970 as a whole, emigration loss among persons who arrived in Australia with the intention of settling was estimated to be about 20 per cent for persons born in the British Isles, 17 per cent for those from Italy and 26 per cent for those from the Federal Republic of Germany. [21]

21. The statistics are inadequate for assessing the balance of migration between Southern Europe and Latin America. Data compiled for the 1950s showed the gross numbers emigrating amount to not quite 1.4 million. Of these numbers, it was estimated that 0.4 million returned, leaving a net intake of just under 1 million. [22] In the 1960s the balance of migration between Italy and Latin America had become positive in favour of Italy and by the latter part of the decade, this may also have been true for Spain. There was probably a small net immigration from Portugal, mainly to Brazil.

Migration currents from the developing regions to industrialized areas

22. One of the most important new trends in international migration that has emerged in the recent period is the increasing volume of migration from the developing regions to the industrialized countries. The much discussed "brain drain" is only one aspect of this migration. In addition, large numbers of workers, sometimes accompanied by their family members, have moved from North Africa and Turkey into Western Europe, while others from the New British Commonwealth countries have gone to the United Kingdom. At the same time, Northern America has been drawing an increasing number of migrants from Latin America, Asia and Africa; and Australia has been taking in larger numbers from Asia and Africa than ever before. Assessment of the scale of these movements must rely almost entirely on the statistics collected by the countries to which these persons migrated.

From developing regions to Northern America and Australia

23. Table 2 shows that between 1951 and 1970 the United States of America admitted as immigrants more than 2.5 million persons from the three developing regions, nearly 2 million of them from Latin America. Immigrants to Canada during this period included about 320,000 persons from the developing regions, with Asians accounting for over half. Australia recorded nearly 320,000 permanent and long-term arrivals from developing regions, nearly three fourths of them from Asia. Unlike the data for the other two countries, Australian data include also students and other persons who expect to remain in the country for more one year. If only persons intending to settle in Australia are considered, the total intake from the developing regions is reduced to only about 125,000.

24. For each of the countries of immigration, a rising trend is shown in the number of immigrants from each of the developing regions. The number of Asian immigrants to the United States in the years 1966-1970 was about six times higher, and the number from Latin America three times higher, than in the first half of the 1950s. By the 1960s, Latin America had replaced Europe as the region supplying the largest number of migrants to the United States.

25. Among the Latin American countries sending large numbers of immigrants to the United States during

[19] R. Irwin and R. Warren, "Demographic aspects of American immigration", in C. F. Westoff and R. Parke, eds., *Demographic and Social Aspects of Population Growth*, vol. I of the Research Reports of the United States Commission on Population Growth and the American Future (Washington, D.C., Government Printing Office, 1972), p. 175.

[20] C. A. Price, "International migration—Australia and New Zealand 1947-1968", (International Population Conference of the International Union for the Scientific Study of Population, London, 1969), p. 2619.

[21] C. A. Price, "Overseas migration to Australia: 1947-70", in C. A. Price, ed., *Australian Immigration; a Bibliography and Digest* (Canberra, The Australian National University, 1971), p. A15.

[22] W. B. Borrie, *loc. cit.*

TABLE 2. IMMIGRANTS TO AUSTRALIA, CANADA AND THE UNITED STATES OF AMERICA FROM AFRICA, ASIA AND LATIN AMERICA, 1951-1970

(Thousands)

Country of immigration and region of last permanent residence of migrants	*Total 1951-1970*	*1951-1955*	*1956-1960*	*1961-1965*	*1966-1970*
Australia	318 6	41.2	52 8	77.9	146 7
Africa	71 6	9 3	10 7	21 0	30 6
Asia	231 5	31 1	41 3	53 8	105.3
Latin America	15 5	0 8	0 8	3 1	10 8
Canada	320 7	35 9	40 4	55 0	189 4
Africa	41 5	3 2	7 0	11 4	19 9
Asia	170 2	20 9	20 8	25 9	102 6
Latin America	109 0	11 8	12 6	17 7	66 9
United States of America [a]	2,547 0	284 8	507 3	665 6	1,089 3
Africa	43 0	5 2	8 9	9 6	19 3
Asia	581.9	50 1	108 9	104 3	318 6
Latin America	1,922 1	229 5	389 5	551 7	751 4

SOURCE Data from national statistical publications and United Nations Statistical Office files

[a] Excluding refugees not accorded permanent residence

the 1960s were Mexico (about 450,000), the Dominican Republic (93,000) and Colombia (72,000) There was also a large immigration from the West Indies—134,000 compared with only about 30,000 in the previous decade. About 378,000 Cubans entered the United States during the 1960s, without having been granted permanent resident status In addition to alien immigration, net arrivals from Puerto Rico to mainland United States numbered 165,000 during the 1960s, considerably below the total of about 450,000 during the previous decade. [23]

26. Nearly 100,000 persons from the Philippines entered the United States as immigrants during the 1960s, as compared with one fifth that many a decade earlier. In fact, with the exception of Mexico, the Philippines was by 1970 sending more immigrants to the United States than any other country. Another important sending area in Asia was Hong Kong, with 75,000 immigrants to the United States in the 1960s. The Immigration Act of 1965 became fully operative in July 1968 and its effects were felt in increased immigration from Asia, as well as from Southern Europe, in the following years. [24]

27. Immigration to Canada from Asian countries took a sharp turn upward in the late 1960s after the provisions of the new immigration regulations adopted in 1962, designed to eliminate discrimination on grounds of race and citizenship, had become effective. Over 100,000 persons from Asia entered Canada as immigrants in the period 1966-1970, four or five times the number that had come in previous 5-year periods

28 Among the settlers to Australia, Lebanese formed the largest single group among the Asians, Indians were next and Turks began appearing in significant numbers in the late 1960s New Zealand has had a noticeable intake of migrants from the Cook Islands, Fiji and Western Samoa [25]

29 As in the case of the European immigrants to Northern America, no data are available on return movements among those who came from the developing regions Australian statistics indicate that return migration has been very slight among the persons who came to settle from Asia and Africa [26]

From the new British Commonwealth to the United Kingdom

30 About the middle of the 1950s, there began an important migration into the United Kingdom of non-Europeans from the newly independent countries of the British Commonwealth, mainly from the West Indies, India and Pakistan, and to a lesser extent from other Asian countries and Africa. Preliminary sample tabulations from the 1971 census of Great Britain show a total of about 680,000 persons born in the new Commonwealth countries who entered the United Kingdom in 1961 or later years; of these 289,000 had been born in India and Pakistan, 152,000 in the West Indies, 127,000 in Africa and 112,000 in other new Commonwealth countries, mostly in Asia. [27]

31 The influx of migrants from the new Commonwealth countries reached particularly high levels in the

[23] R. Irwin and R Warren, "Demographic aspects of American immigration" in C F Westoff and R Parke, eds, *Demographic and Social Aspects of Population Growth*, vol [illegible] of [illegible]
Po[illegible]
D[illegible]

[24] *Ibid*, pp 171-172

[25] C A Price, "Internal [illegible] ... A[illegible]alia and New [illegible] *Bibliography* [illegible]

[illegible] suses and Surveys, London and [illegible] burgh, *Census 1971, Great Br*[illegible] *cent sample*) (London, 1973),

period 1960-1962, immediately prior to the passage of the Commonwealth Immigrants Act of 1962, which for the first time placed restrictions on migration from Commonwealth countries into Britain. Although the Act curtailed such movements, they did not stop, since dependants of immigrants already resident in Britain, as well as persons with specific job offers, or having specialized skills, were still permitted to enter. While West Indian migration never again reached its earlier levels, immigration from India and Pakistan, which was reduced immediately following passage of the 1962 Act, rose again in the late 1960s. Because of events in East Africa, Britain received a flow of Asians from that country who were holders of British passports and not subject to the restrictions of the 1962 Act; however, the enactment of a new Commonwealth Immigrants Act in 1968 brought further curbs. [28]

From North Africa to France [29]

32. A two-way migration between Algeria and France has long existed, and it is estimated that as early as 1950 from 200,000 to 250,000 Algerian workers were employed in France. By 1954, the number had risen to about 300,000, but the balance is said to have been negative in the latter half of the 1950s. [30] Official statistics for the period 1961-1970 show a net inward balance of 285,000. [31] While free circulation of workers had previously been permitted, a protocol adopted in 1964 called for the arrival of Algerian workers in France to be regulated, taking into account employment conditions in France and the availability of labour in Algeria. [32]

33. Accords between the Government of France and the Governments of Morocco and Tunisia signed in 1963 led to increased immigration from these countries. More than 150,000 Moroccans arrived in France during the decade 1961-1970, and nearly 60,000 Tunisians entered in the five years, 1966-1970. There are no official records on the number of Moroccans and Tunisians who have returned home and hence on net immigration.

Other movements from Asia, Africa and America to Europe

34. During the 1960s, Turkey became a major exporter of labour to the industrialized countries of Western Europe, and far outranked any other Asian country with respect to the numbers of migrants sent to Europe. Moreover, by the end of the decade the annual number of Turkish emigrants to Western Europe was as high as that from any of the leading sending countries of Southern Europe. [33] Too few employment opportunities at home created the conditions for large-scale out-migration, and the proximity of Turkey to Europe facilitated these movements.

35. From migration statistics collected by the receiving countries in Western Europe, and estimates of their foreign populations at different dates, it can be deduced that net immigration from Turkey may have amounted to roughly 450,000 during the 1960s. The Federal Republic of Germany was the destination of the great majority of these workers, absorbing perhaps 370,000 of the total, while the remainder went to Austria, Belgium, France, the Netherlands and Switzerland.

36. Belgium, the Federal Republic of Germany and the Netherlands together may have had a net intake of as many as 60,000 persons from North Africa during the 1960s. These were mainly Moroccans, Tunisians being numerous only among migrants to the Federal Republic of Germany. The number of Algerians who have migrated to countries other than France appears to have been very small. In addition to migration from North Africa to Western Europe, there has also been some illegal migration from North Africa into southern Italy and parts of Greece and Spain, where shortages of certain types of low-paid agricultural workers have developed as a result of excessive out-migration. [34]

37. During the 1960s, the Netherlands registered a net immigration in the neighbourhood of 30,000 from the Netherlands Antilles and Surinam. As persons from these areas are holders of Netherlands passports, they are less subject to control and channeling into occupations where labour shortages exist than are southern European workers. On the other hand, they are more likely to settle permanently in the Netherlands. [35]

Migrations as a result of political events

38. Since migrations resulting from political events are generally one-time occurrences, they are distinguished from economic migrations which result from choices by individuals in their search for better living conditions and which follow more predictable patterns and exhibit more regular flows. [36] Among the currents of migration in the period under review, which involved

[28] K. Jones and A. D. Smith, *The Economic Impact of Commonwealth Immigration* (Cambridge, Cambridge University Press, 1970), p. 13.

[29] The repatriation of French nationals from North Africa is discussed in para. 40.

[30] M. Trebous, *Migration and Development; the Case of Algeria* (Paris, Development Centre of the Organisation for Economic Co-operation and Development, 1970), pp. 57 and 61.

[31] France, Institut national de la statistique et des études économiques, *Annuaire statistique de la France 1973*, p. 14.

[32] M. Trebous, *op. cit.*, p. 61.

[33] According to Gokalp, by 1972, Turkey had risen to first place among all exporters of labour to industrialized Europe. As of the end of 1971, about 1.6 million workers were on the waiting list in Turkey for emigration. C. Gokalp, "L'émigration turque en Europe et particulièrement en France", *Population* (Paris), vol. XXVIII, No. 2 (March-April 1973), pp. 341-342.

[34] H. Wander, "Summary statement on trends in international migration", working paper No. 24, Seminar on Demographic Research in Relation to International Migration, Buenos Aires, 5-11 March 1974. See also International Labour Organisation, "Some growing employment problems in Europe" (D.22/1973), Second European Regional Conference of the International Labour Organisation, Geneva, 1974, p. 83.

[35] A. J. Marshall-Goldschvartz, *The Import of Labour: The Case of the Netherlands* (Rotterdam, Rotterdam University Press, 1973), pp. 33-34.

[36] International Labour Office, *op. cit.*, p. 1.

the movement of considerable numbers of people between major geographical regions for other than economic reasons, are the repatriation of Europeans which occurred at the time the former European colonies attained their independence, the migration from Eastern Europe, the migration to Israel and the migration from Cuba. While the resettlement of refugees after the Second World War involved population transfers on a large scale, the bulk of these movements took place in the late 1940s and are, therefore, not discussed here The migration of Asians from East Africa has already been referred to in paragraph 31 Some important refugee movements which have taken place in recent years within Asia and Africa have been briefly mentioned in paragraphs 2 and 8, respectively

39. The repatriation of Europeans from former colonies in Africa and Asia was a demographically significant event in the post-war period, since it involved the transfer back to Europe of close to 1.5 million persons. The bulk of this movement, concentrated within the space of a few years, caused Europe to temporarily become a continent of net immigration during the first half of the 1960s

40 By far the largest of these movements was that of French citizens back to France from Algeria after the latter country gained its independence. Official estimates of repatriations of French citizens from Indo-China and North Africa show a total of 350,000 returned to France from 1954 to 1959 and 970,000 from 1960 to 1965.[37]

41. After Indonesia attained independence in 1950, there was a large movement from that country to the Netherlands, amounting to a net figure of about 180,000 in the 1950s[38] In 1958 alone, about 38,000 Netherlands citizens returned from Indonesia, and in 1962 about 20,000 returned from West Irian[39] Repatriations of Belgian nationals when the former Belgian Congo[40] became independent in 1960 may have numbered about 15,000 according to the Belgian migration statistics published for that year. Between 1960 and 1965, about 45,000 Italians returned to Italy from North Africa, mainly from Tunisia and Algeria.

42. By 1950, most of the large post-war movements of population affecting Eastern Europe had been completed. While each of the six countries of the region registered some net emigration during the past two decades, only in the German Democratic Republic was the volume large in relation to total population size Emigration from the German Democratic Republic, which amounted to a net figure of about 1 9 million in the 1950s, continued at a high rate until 1961, and wen[t] mainly to the Federal Republic of Germany. Emigratio[n] from several of the Eastern European countries wa[s] confined to particular years and related to particula[r] events Thus, there was a sizable emigration fro[m] Hungary in 1956 and 1957 and from Czechoslovaki[a] after August 1968 Romania has at various times per[-] mitted large numbers of its Jewish population t[o] emigrate to Israel, and Bulgaria transferred some of it[s] Turkish minority to Turkey in 1950 and 1951 Thes[e] actions largely explain the net emigration balance[s] shown for these countries in the following section Emigration from Poland has followed a somewha[t] different pattern from that of other Eastern Europea[n] countries in that it has constituted a more continuou[s] flow In the latter half of the 1950s, there was a repatria[-] tion of ethnic Poles and Jews from the Soviet Union but this immigration was offset by an emigration to th[e] Federal Republic of Germany under an agreement th[e] purpose of which was to unite families

43 Israel is an unusual case of a country whos[e] population is made up predominantly of migrants, mos[t] of whom were drawn to the country for other tha[n] economic motives Although the heaviest immigratio[n] took place in the years immediately after independenc[e] was declared in 1948, even as late as 1970 over half o[f] the population (53 per cent) was foreign-born.

44 In the years between 1951 and 1960, abou[t] 470,000 persons migrated to Israel, 150,000 fro[m] Europe, 139,000 from Asia and 166,000 from Africa By the following decade, the number had declined t[o] 355,000, of whom 131,000 came from Europe, 46,00[0] from Asia and 149,000 from Africa, the great majorit[y] of the latter being Moroccans who migrated in the earl[y] 1960s Most of the European immigrants came fro[m] Eastern Europe and the USSR, particularly fro[m] Romania, which in the years 1961-1964 alone sen[t] 66,000 Immigration from the Union of Soviet Socialis[t] Republics totalled only about 10,000 during the 1961[-] 1970 period, though it rose noticeably in more recen[t] years, to about 13,000 in 1970 and 32,000 in 1972 Immigrants from Northern America numbered abou[t] 8,000 and from Latin America about 17,000 durin[g] the 1960s.[41]

45. Not all of the immigrants to Israel hav[e] remained. Official estimates place emigration at 73,00[0] for the years 1961-1970,[42] Western European countrie[s] and the United States of America being the mai[n] destinations of those who left. While net immigratio[n] no longer outranked natural increase as a source o[f] population growth in the 1960s, it nevertheless remaine[d] relatively high, amounting to about 1.2 per cent of th[e] total population The Government's policy has been t[o] admit all Jews who wish to settle in the country, bu

[37] France, Institut national de la statistique et des études économiques, *op cit*, p 14

[38] This figure includes, in addition to returning Netherlanders, some Indonesians who came to settle in the Netherlands See International Labour Office, *International Migration 1945-1957*, p 176, and statistical publications of the Netherlands

[39] A M Rose, *Migrants in Europe; Problems of Acceptance and Adjustment* (Minneapolis, University of Minnesota, 1969), p 8

[40] Now known as Zaire

[41] Data compiled from Israel, Central Bureau of Statistic[s]

special efforts have been made to attract those from Western countries possessing needed skills.[43]

46. During the 1960s, about 378,000 persons who left Cuba entered the United States as parolees who had not yet been accorded permanent resident status. Other emigrants from Cuba travelling *via* Spain have been admitted to the United States on immigration visas. In 1969, there were estimated to be about 20,000 Cuban refugees living in Spain, about 15,000 in Puerto Rico and a total of about 48,000 in various Latin American countries.[44] Altogether, it appears that Cuba, with a total population of about 8.6 million in 1970, lost 500,000 of its population through emigration in the 1960s.

Migration within Europe

47. Rapid economic growth in Western Europe and a slow expansion of the domestic labour force, owing to earlier declines in fertility, gave rise in the 1960s to a large-scale movement of population within Europe. The countries of Southern Europe, with natural increase rates that were comparatively high until recently by European standards and labour supplies often expanding at rates beyond the absorptive capacities of their economies, increasingly exported their surplus labour to their northern neighbours. The Italians were the first to respond on a large scale to the employment opportunities offered in Western Europe. Already by the second half of the 1950s, a shift was apparent in the direction of Italian migration from overseas destinations to other European countries, and each succeeding year saw a decline in the absolute number of Italians migrating overseas. Whereas in 1953-1955, the numbers migrating elsewhere in Europe just about equalled those leaving for overseas, by 1960-1962, the balance had shifted decidedly and 84 per cent of Italian emigrants chose European destinations. Until the late 1950s, other Southern European countries were relatively untouched by continental migration currents.[45]

48. France was the destination for many of the European migrants in the 1950s, though Switzerland, with a steadily rising number of foreign workers, and Belgium were also countries of immigration. The Federal Republic of Germany began to attract migrants on a large scale only in the latter part of the 1950s; up to that time, its large intake of population consisted mainly of ethnic Germans who had been expelled from Eastern European countries after the war and others who left the German Democratic Republic.

49. Some of the main patterns of migration between the leading Southern European countries of emigration and the principal countries of immigration of Western Europe during the 1960-1970 decade are suggested by the estimates presented in table 3. Since there are fe good statistics for measuring these movements, tl figures should be taken as indicating only the approx imate order of magnitude of net migration balanc between the given countries. Several countries n included in the table—Austria, Luxembourg, Swede and the United Kingdom—also received some migran from Southern Europe. When the numbers going t these countries are included, it appears that Souther Europe lost about 2.6 million persons through migratio to Western and Northern Europe during the decade.

50. According to these estimates, the Feder Republic of Germany had a net immigration of over million from the five countries of Southern Europe. A discussed elsewhere, other large contributors to th country's net immigration balance, which totalled ove 2 million for the decade, were Turkey and the Germa Democratic Republic. The migration of Italians t Germany began before the 1960s. At the time of th 1961 census in the Federal Republic, almost 20,00 Italians were already present in the country. Wherea Italians had constituted more than half of all ne foreign workers in 1960, this proportion fell sharpl during the decade, while first Greek and Spanish, an later Turkish and Yugoslav workers began to appear i increasing numbers.[46] While there were only abou 16,000 Yugoslavs in the Federal Republic of German at the time of the 1961 census, by the end of the 1960s Yugoslavia was unquestionably the leading sender o migrants to the Federal Republic, with Turkey clos behind.

51. About three quarters of immigrants to Franc during the years 1950-1957 came from Italy,[47] but thi pattern changed during the 1960s when first Spain an later Portugal furnished the largest numbers. Accordin to the statistics compiled by the French Office nationa d'immigration, the numbers of permanent workers an their dependants who entered France during 1961-197 included about 600,000 Portuguese, 585,000 Spaniards 215,000 Italians and 73,000 Yugoslavs. As Franc keeps no records on emigration, the net migratio balances shown in table 3 are estimates. The remainde of the immigrants came mainly from North Africa, a noted earlier.

52. In Switzerland, where foreigners now make u more than a quarter of the labour force, Italy has furnished the largest numbers of foreign workers durin the post-war period, and this pattern was maintained in the 1960s, although Spanish workers also came in sizable numbers, and a smaller group of Yugoslavs appeared. The large influx of foreigners caused considerable public resentment and a series of restrictions on immigration were imposed by the Government beginning in 1963. By the end of 1970, the migration

[43] *The Determinants and Consequences of Population Trends; New Summary of Findings on Interaction of Demographic, Economic and Social Factors*, vol. I, chap. VII, para. 100.

[44] *World Refugee Report, 1970* (New York, United States Committee for Refugees, 1970), pp. 18-19.

[45] International Labour Office, *op. cit.*, p. 151.

[46] See the data in W. R. Böhning, *The Migration of Workers in the United Kingdom and the European Community* (London, Oxford University Press, 1972), p. 34.

[47] International Labour Office, *op. cit.*, p. 146. Algerians are not included in these figures.

TABLE 3 APPROXIMATE ORDER OF MAGNITUDE OF MIGRATION BALANCES BETWEEN PRINCIPAL SENDING AND RECEIVING COUNTRIES OF EUROPE, 1960-1970

(Thousands)

	Receiving countries					
Sending countries	*Total* [a]	*Federal Republic of Germany*	*France*	*Switzerland*	*Belgium*	*Netherlands*
TOTAL [a]	2,390	1,060	940	280	70	40
Greece	250	240	b	b	b	b
Italy [c]	500	230	100	150	12	b
Portugal	510	40	450	b	b	b
Spain	640	150	330	100	40	23
Yugoslavia	490	400	55	25	b	b

SOURCE. Estimates are derived from data available for the receiving countries including [illegible] European coun- [illegible] 000, the Nether- [illegible]

balance had turned negative for the first time since the end of the Second World War. [48]

53. While there was substantial immigration into Belgium from Italy during the 1950s, Spain replaced Italy as the main supplier of immigrants in the 1960s. Net immigration from France was also important In fact, France appears to have sent many more migrants to Belgium than did any Southern European country other than Spain.

54. The Netherlands reversed its traditional role as a country of emigration, and in the 1960s became a country of net immigration. While a considerable number of Spanish workers were attracted to the Netherlands, currents from other Southern European countries were small and were surpassed by the numbers drawn from sources outside Europe. At the same time, Dutch workers migrated to Belgium and the Federal Republic of Germany, resulting in net emigration balances with those countries.

55. In Austria, the small net immigration balance in the 1960s also marked a reversal of its position in the 1950s. Foreign workers began to be recruited in 1962, with the largest contingent coming from neighbouring Yugoslavia and a smaller number from Turkey. [49] Early in 1971, 90,000 Yugoslavs were said to be working in Austria. [50]

56. Among the Southern European countries, Italy had been the main source of emigrants to Western Europe during the 1950s, but this position was taken over by other countries in the 1960s. Annual emigration statistics for Italy in the 1960s show an uninterrupted decreasing trend throughout the decade, [51] and a strong return movement that had developed even before the middle of the 1960s as a result of the progress of industrial development in the northern part of the country. [52] Though still substantial, the net emigration balance of Italy in the 1960s fell well below the level recorded in the previous decade.

57. Nearly all of the Spanish emigration during the 1960s was directed towards Western Europe, with very little going overseas The trend of annual emigration from Spain was sharply upward during the early 1960s. It dropped after 1964 and continued at a low point during the years of recession in the economies of some of the countries of immigration, but again reached peak levels in 1969-1970

58. Emigration from Greece increased greatly during the 1960s, and while traditional currents to Australia, Canada and the United States continued and even exceeded the volume of the 1950s, a large-scale exodus also developed to the Federal Republic of Germany, with minor streams recorded to the other main immigration countries of Western Europe The annual pattern of this emigration shows a sensitivity to economic conditions in the Federal Republic of Germany, falling sharply during the recession year of 1967, and recovering again with the favourable economic trend by 1969. [53]

59. A striking feature of Portuguese emigration has been its tendency for strong attraction toward a single country. Until recently, that country was Brazil, the

[48] See the discussion of Swiss immigration policy in K. B Mayer, "Foreign workers in Switzerland and Austria", *European Demographic Information Bulletin*, vol II, No 3 (1971), pp. 93-96

[49] *Ibid*, pp 99-100 and table 6

[50] I Baucic, *The Effects of Emigration from Yugoslavia and the Problem of Returning Emigrant Workers*, European Demographic Monographs (The Hague, Martinus Nijhoff, 1972), p. 1.

[51] M Livi-Bacci and H M Hagmann, *loc cit*, p. 9.

[52] *Economic Survey of Europe in 1965*, part 1, *The European Economy in 1965* (United Nations publication, Sales No. 66 II.E 1), p 80

[53] B Kayser, *Cyclically-determined Homeward Flows of Migrant Workers and the Effects of Emigration* (Paris, Organisation for Economic Co-operation Development, 1972), p 16

choice of 70 per cent of Portuguese emigrants in the 1950s. In the early 1960s, France began replacing Brazil, and by 1967, over 60 per cent of the legal emigration from Portugal was to France and only 2 per cent to Brazil. In addition to the legal emigration to France, there has been much illegal migration that escapes detection in the Portuguese emigration statistics. [54] The trend of emigration from Portugal was sharply upward during the 1960s.

60. This was the case also for Yugoslavia. Yugoslav migrants went mainly to the Federal Republic of Germany, but Austria, France, Sweden and Switzerland also received substantial numbers.

61. Among the countries of Northern Europe, only Sweden has had a net immigration of considerable numbers in the post-war period. Immigration to Sweden has been increasing, moreover, the net inward balance in the 1960s being about double that of the 1950s. Since 1954, the Scandinavian countries have had a common labour market allowing for the free movement of workers. Finland has been the chief supplier of labour to Sweden, particularly in the 1960s when migrants from that country accounted for nearly two thirds of the net immigration of Sweden. In the 1960s, there was a new movement from Southern Europe and Swedish migration statistics show a net intake of 25,000 persons from Yugoslavia, 13,000 from Greece and 9,000 from Italy during the decade.

62. The United Kingdom is unique as a country which, while traditionally sending large numbers of emigrants abroad, has during the past 20 years received a nearly matching number of immigrants from abroad. Only a small proportion of this migration, however, involves exchanges with other European countries. In such migration, the United Kingdom has had a positive balance, with Ireland continuing to supply the largest number of immigrants. Though the number coming from Ireland was reduced in the 1960s, it was still substantial, the net intake being about 100,000, according to one estimate. [55] From the continent, Italian immigrants were most numerous both in the 1950s and in the 1960s; in addition, 10,000 immigrants came from Malta. While the balance of migration with the continent has thus far been in favour of the United Kingdom, workers from that country migrate to the continent, particularly to the Federal Republic of Germany. It was estimated that the flow of British to the Federal Republic of Germany and other countries of the European Economic Community might rise considerably as a result of the entrance of the United Kingdom into the Community. [56]

Migration as a component of population growth

63. Statistics of immigration and emigration derived from frontier control procedures are not sufficiently accurate for most countries to provide reliable estimates of net migration. Better estimates, though also subject to short-comings, are obtained by subtracting natural increase from total population growth between two census dates, or during periods close to census dates. The estimates derived in this manner [57] presented in table 4 show that, whereas Canada and the United States together registered a net gain of 8.7 million persons through immigration during the two decades from 1950 to 1970, and Australia and New Zealand together received close to 2 million, the net loss sustained by Europe—the traditional supplier of migrants to the overseas areas—amounted to only about 3 million, almost all of it occurring between 1950 and 1960. These net balances are the product of a complex pattern of movements which also involved repatriations of Europeans and increasing migration from the developing regions to the more industrialized countries.

64. The table also suggests the magnitude of changes which occurred within Europe, where Western Europe gained 8.7 million population through migration—a figure equal to more than half its natural increase during the same period. On the other hand, according to these figures, Southern Europe experienced a net emigration of over 7 million—a figure equal to more than one quarter of its gain through natural increase. Eastern Europe and Northern Europe were also regions of net emigration, though the outflow was at a much lower rate than in the case of Southern Europe.

65. In terms of absolute numbers, the countries that registered the largest net migration gains were the United States, with a net intake of about 6.9 million; the Federal Republic of Germany, with 4.8 million; and France, with 3.3 million in the two decades. As large as these gains were in absolute numbers, in relation to the size of the populations concerned, they are seen to have amounted to only about 0.2 per cent per annum for the United States and 0.4 per cent for France and the Federal Republic of Germany. As a factor in population growth, immigration played a much more important rôle in Australia, where it amounted to 0.8 per cent annually of the total population. While high, this figure fell slightly short of the Government's goal of a 1 per cent increase in population growth annually due to net migration, which was intended to match the anticipated 1 per cent annual increment from natural increase. [58] In Canada and Switzerland, annual net immigration was 0.5 and 0.6 per cent of the total population, respectively.

66. In view of the lower rates of natural increase prevailing in Europe, as compared with those of the

[54] Y. Leloup, "L'émigration portugaise dans le monde et ses conséquences pour le Portugal", *Revue de géographie de Lyon*, vol. 47 (1972).

[55] C. A. Moser, "Statistics about immigrants: objectives, sources, methods and problems", *Social Trends*, No. 3 (1972), p. 23.

[56] W. R. Böhning, *op. cit.*, chap. 11.

[57] Adjusted figures are shown for a few countries. For example, the net migration estimate for the United Kingdom has been adjusted to allow for a change in the number of the armed forces overseas and visitor balance, information on which was provided in United Kingdom, *Annual Abstract of Statistics 1973*, p. 19. For Yugoslavia, the estimate of net migration was adjusted to reflect the number of workers abroad who were included in the *de jure* census enumeration of 1971. Other adjusted figures are indicated in foot-notes to the table.

[58] C. A. Price, *loc. cit.*, p. 2619.

TABLE 4 ESTIMATES OF NET MIGRATION AND ITS RELATION TO TOTAL POPULATION SIZE AND NATURAL INCREASE IN SELECTED COUNTRIES OF EUROPE, NORTH AMERICA AND OCEANIA, 1950-1970

Region and country	Net migration[a] (thousands)			Average annual net migration 1950-1970 as a percentage of 1960 population	Ratio of net migration to natural increase, 1950-1970 (percentage)
	Total 1950-1970	1950-1960	1960-1970		
Europe	−3,028	−2,653	− 375	−0.04	− 4
Western Europe	+8,748	+3,882	+4,866	+0.3	+ 51
Austria	− 103	− 141	+ 38	−0.1	− 17
Belgium	+ 211	+ 59	+ 152	+0.1	+ 27
Federal Republic of Germany	+4,780	+2,723	+2,057	+0.4	+ 81
France	+3,258	+1,080	+2,178[b]	+0.4	+ 55
Luxembourg	+ 22	+ 7	+ 15	+0.4	+105
Netherlands	− 50	− 142	+ 92	−0.02	− 2
Switzerland	+ 630	+ 296	+ 334[b]	+0.6	+ 72
Southern Europe	−7,301	−3,475	−3,826	−0.3	− 29
Greece	− 651	− 196	− 455[b]	−0.4	− 36
Italy	−1,958	−1,166	− 792	−0.2	− 23
Malta	− 81	− 43	− 38	−1.2	− 89
Portugal	−1,952	− 662	−1,290	−1.1	− 90
Spain	−1,377	− 826	− 551	−0.2	− 19
Yugoslavia	−1,282	− 582	− 700[b]	−0.3	− 26
Eastern Europe	−3,777	−2,559	−1,218	−0.2	− 21
Bulgaria	− 178	− 163	− 15	−0.1	− 13
Czechoslovakia	− 174	—	− 174	−0.1	− 8
German Democratic Republic	−2,488	−1,874	− 614	−0.7	−215
Hungary	− 161	− 164	+ 3	−0.1	− 14
Poland	− 526	− 220	− 306	−0.1	− 6
Romania	− 250	− 138	− 112	−0.1	− 6
Northern Europe	− 698	− 501	− 197	−0.05	− 8
Denmark	− 32	− 52	+ 20	−0.03	− 5
Finland	− 214	− 73	− 141	−0.2	− 26
Ireland	− 558	− 397	− 161	−1.0	−101
Norway	− 10	− 14	+ 4	−0.01	− 2
Sweden	+ 297	+ 93	+ 204	+0.2	+ 41
United Kingdom	− 181	− 58	− 123[b]	−0.02	− 5
Northern America	+8,698	+4,086	+4,612	+0.2	+ 17
Canada	+1,802	+1,105	+ 697	+0.5	+ 31
United States of America	+6,896	+2,981[b]	+3,915[b]	+0.2	+ 15
Oceania	−1,857	+ 933	+ 924	+0.7	+ 55
Australia	+1,712	+ 831	+ 881	+0.8	+ 65
New Zealand	+ 145	+ 102	+ 43	+0.3	+ 19

[a] Unless otherwise indicated, the estimates of net migration have been derived by subtracting natural increase from population growth during the specified periods, which run from mid-year to mid-year.
[b] Adjusted estimates.

overseas settlement areas during the period under study, net migration balances for European countries take on particular importance when related to their natural increase Thus, in three Western European countries—the Federal Republic of Germany, Luxembourg and Switzerland—gains in population through net migration amounted to about three fourths or more of those registered from natural increase. The highest ratio among the overseas countries was that for Australia—66 per cent. For the United States, the corresponding figure was only 15 per cent.

67. The countries sustaining the heaviest net migration outflows in absolute numbers during the 20 years were the German Democratic Republic (nearly 2.5 million), Italy and Portugal (about 2 million each), and Spain and Yugoslavia (between 1.25 and 1.5 million each). When these emigration losses are related to population size, their demographic significance is seen more clearly. Looked at in this way, the migration losses of Italy and Spain do not loom so large, amounting to only 0 2 per cent of their populations annually. The annual migration loss of Yugoslavia averaged about 0.3 per cent of that country's population, while the comparable figure for Greece was about 0.4 per cent. Much higher rates of emigration, amounting to more than 1 per cent of the total population annually, are shown for Malta and Portugal. In the small population of Malta, with only slightly more than 300,000 inhabitants, emigration was nearly sufficient to [illegible]

increase. Even so, it fell short of government goals of a net emigration of 5 per cent per annum.[57]

66. In Ireland, emigration was of sufficient volume to completely offset natural increase and the population declined between 1951 and 1971, while in Portugal, a small rise in population size between 1950 and 1961 was followed by population decline in the 1960s. The net migration estimate for Greece implied a loss equal to one third of the gain through natural increase. Italy and Yugoslavia lost about one quarter of their natural increase and Spain about one fifth.

ESTIMATES OF NET MIGRATION FOR MAJOR REGIONS OF THE WORLD

67. Preliminary estimates of net migration balances for major regions of the world[58] have been calculated for 1961-1970 on the basis of the data already reviewed. These estimates are shown in table 5, where they are compared with similar estimates for 1946-1957 prepared by the International Labour Office. The table shows that, while net immigration to Northern America and Oceania continued at the same or higher levels in the 1960s as in the earlier post-war period, sharp reversals of previous patterns occurred in some of the other major regions. Whereas Europe had lost close to 5.5 million population in the 12 years from 1946 to 1957, in the 1960s its negative balance was negligible. Without the repatriation of more than 2 million persons described earlier (paragraphs [illegible]), Europe would have continued to be a region of net emigration in the 1960s, but the balance would have been much smaller than that of previous decades.

TABLE 5. ESTIMATED NET MIGRATION BALANCES FOR MAJOR WORLD REGIONS, 1946-1957 AND 1961-1970

(Millions)

Region	1946-1957[a]	1961-1970
Africa	—1.5	—1.6
Asia	—1.5	—1.2
Europe	—5.4	—1.3
Latin America	—1.1	—1.3
Northern America	—3.4	—4.2
Oceania	—1.1	—1.3

[a] From International Labour Office, International Migration, 1945-1957, Studies and reports, New series, No. 54 (Geneva, 1959), p. 314.

70. Even more striking is the shift of Latin Ameri[ca] from a region of net immigration to one of substan[tial] net emigration. Whereas Latin America is estimated [to] have gained nearly 1 million in population through [net] migration during 1946-1957, it lost nearly 2 milli[on] through emigration during the decade of the 1960s. [It] should be recalled here that Latin America is defined [to] include the Caribbean region.

71. The other developing regions—Africa a[nd] Asia—are also seen to have lost population through [mi]gration in the 1960s. About 1 million of the estimated [net] loss of Africa, 1.6 million, was accounted for by t[he] repatriations of European nationals. Although net em[i]gration from Asia, estimated at about 1.2 million duri[ng] the 1960s, was more than double the number for t[he] earlier period, the loss is not significant in relation [to] that continent's population size.

72. The volume of the migratory streams from t[he] developing regions to Europe and the overseas settl[e]ment areas during 1961-1970 is better seen in table [6], which eliminates the effects of repatriations and [of] reverse currents, such as those from Europe to Isra[el], South Africa and Latin America.

TABLE 6. VOLUME OF MIGRATORY STREAMS FROM THE DEVELOPING REGIONS, 1961-1970

(Thousands)

Sending region	Receiving region: Europe	Receiving region: Northern Ameri[ca] and Ocean[ia]
Total	1,570	2,440
Africa	500	90
Asia	770	600
Latin America	300	1,750

73. According to these figures, Europe had a n[et] intake of about 1.7 million from the developing region[s], while the overseas settlement areas had about 2 million, of which 1.8 million was in Northern Americ[a] alone. As reviewed earlier in the paper, Latin America[n] migrants were drawn overwhelmingly to Norther[n] America, although there was also an important curre[nt] from the West Indies to the United Kingdom and [a] small movement from Netherlands territories to th[e] Netherlands. The approximately 500,000 migrants fro[m] Africa to Europe were mainly from North Africa an[d] the new British Commonwealth. Compared with th[e] numbers from Africa who have migrated to Europe, relatively few have gone to the overseas settlemen[t] areas. During the 1960s, migration from Asia t[o] Northern America and Oceania was clearly on the ris[e], but it did not equal the magnitudes involved in th[e] movements of Turks to Western Europe, and of Indians, Pakistanis and other Asians to the United Kingdom.

[57] C. A. Price, "Migration as a means of achieving population targets" in Report of CICRED on the Seminar on Demographic Research in Relation to Population Growth Targets (Trinidad and Tobago, 1973), p. [illegible].

[58] In deriving these estimates, certain adjustments were required because of inconsistencies in the data for sending and receiving countries. Thus, the balances shown for Northern America and Europe do not agree exactly with those given in table 4.

RECHERCHE DÉMOGRAPHIQUE EN LIAISON AVEC LES MIGRATIONS INTERNATIONALES

Comité international de coordination des recherches nationales en démographie

PROGRAMME DU SÉMINAIRE

1. Le Comité international de coordination des recherches nationales en démographie (CICRED) a organisé à Buenos Aires du 5 au 11 mars 1974 un séminaire sur "La recherche démographique en liaison avec les migrations internationales". Le choix d'un tel sujet a été déterminé par le vœu exprimé plusieurs fois par la Commission de la population de voir porter davantage d'attention sur le problème jusqu'alors négligé des migrations internationales

2. Les débats se sont organisés autour des neuf thèmes suivants :

I. *Panorama des migrations internationales*

II. *La mesure des migrations internationales*
   1. Exemples types de systèmes d'observation des migrations internationales :
      (*a*) Enregistrement permanent
      (*b*) Recensements
      (*c*) Enquêtes
   2. Aspects méthodologiques de la mesure des migrations internationales

III. *Déterminants et mécanismes de la migration*
   1. La pertinence des modèles de migrations internes pour l'explication des migrations internationales
   2. Facteurs économiques et non économiques dans la dynamique des migrations internationales
   3. Les déterminants de l'exode des cerveaux

IV. *Migrations internationales et mécanismes de la croissance*
   1. Migration, marché du travail et théorie de la croissance
   2. Migration et développement économique
   3. Migration et théorie de l'échange international

V. *Implications démographiques des migrations internationales*
   1. Effets sur la structure par âges et la fécondité des différents modèles de migration
   2 Migration et politique de restriction de la population

VI *Migrations et société*
   1. Migration et relations ethniques
   2. Migration et changement social
   3. Le problème des retours

VII. *La migration internationale et la répartition mondiale de la population*
   1. Le droit à la migration et les politiques de migration
   2. Migrations spontanées, migrations assistées et coopération internationale
   3 L'action sociale en faveur des travailleurs migrants

VIII. *Les migrations internationales* (état des travaux et des connaissances)
   1. Deux monographies :
      (*a*) Un pays de départ (Yougoslavie)
      (*b*) Un pays d'arrivée (Argentine)
   2. Tendances de la recherche

IX. *Programme de recherche*

3. La nature du problème des migrations internationales a orienté le choix des thèmes retenus pour le séminaire. A cet égard, deux caractéristiques de la migration apparaissent déterminantes. D'une part, la migration est un fait social complexe [illegible] éléments démographiques, économiques, sociologiques etc., ce qui impose une approche [illegible] D'autre part, si la migration n'est [illegible] nécessaire du cycle de vie, ni un [illegible] mental comme la production [illegible] clair cependant qu'il n'y a pas [illegible] nomique sans une forme [illegible] nationale — de mobilité [illegible] mis sur la relation [illegible] pement économique [illegible] surtout étudié les problèmes [illegible] travail. Les autres [illegible] politiques, ethniques [illegible] — seulement évoqués.

4. En [illegible] retenus. [illegible]

panorama des migrations à travers le monde. De nombreuses organisations internationales (l'Organisation des Nations Unies [ONU] et ses diverses commissions régionales, l'Organisation de coopération et de développement économiques [OCDE], le Comité intergouvernemental pour les migrations européennes [CIME], etc.) et institutions de recherche ont apporté leur contribution. Les auteurs des différents rapports régionaux ont rappelé les tendances historiques de la migration, ses caractères structurels et les politiques suivies par les différents Etats et ont dégagé les perspectives d'avenir.

5. Un rapport de synthèse a été présenté par Mme H. Wander, de l'Institut für Weltwirtschaft de Kiel.

6. La seconde séance a été consacrée à la mesure des migrations internationales et aux problèmes théoriques et pratiques qu'elle soulève. A cet effet, en complément au rapport sur les aspects méthodologiques de mesure des migrations internationales, ont été exposés trois exemples types de systèmes d'observation des migrations internationales : le système d'enregistrement permanent, les recensements, les enquêtes.

7. L'analyse des déterminants de la migration, thème de la troisième séance, ne peut prétendre à l'exhaustivité; au lieu de dresser une liste des nombreuses variables explicatives, il a paru préférable de mettre l'accent sur trois problèmes spécifiques : la pertinence des modèles de migrations internes pour l'explication des migrations internationales, le poids respectif des facteurs économiques et non économiques dans la dynamique de la migration et les déterminants de l'exode des cerveaux.

8. Les quatrième, cinquième et sixième séances ont eu pour objet d'explorer les implications économiques, démographiques et sociologiques de la migration. Elles ont permis d'analyser la relation migrations internationales-développement économique, de mesurer l'incidence de la migration sur les structures démographiques, d'apprécier la signification de la migration pour la société dans son ensemble.

9. Les politiques de migration ont été examinées lors de la septième séance. Plutôt que de dresser un inventaire des instruments et objectifs en ce domaine, la discussion a été centrée sur trois questions fondamentales : le droit à la migration, l'avantage comparé des migrations spontanées et des migrations assistées, les types d'action sociale en faveur des travailleurs migrants.

10. A la huitième séance, pour illustrer la nécessité d'une approche multidisciplinaire du processus migratoire, deux études de cas ont été présentées (un pays de départ : la Yougoslavie, et un pays d'arrivée : l'Argentine). On s'est efforcé, dans cette avant-dernière séance, en préalable au rapport d'ensemble, de faire le point des tendances de la recherche, au niveau mondial. Cette typologie de l'état des travaux et l'identification d'un certain nombre de principes fondamentaux quant à la recherche en ce domaine ont permis, à partir du rapport final, d'établir une liste des recherches prioritaires. En voici la liste telle qu'elle ressort de la lecture du rapport d'ensemble adopté par le séminaire à la dernière séance.

Propositions et sujets de recherche contenus dans le rapport

11. Le séminaire a proposé la liste suivante concernant les recherches nécessaires (les numéros figurant après chaque proposition de recherche renvoient aux paragraphes du rapport d'ensemble; il est conseillé de se reporter au texte pour connaître le contenu précis des propositions et sujets) :

(1) Le développement économique a engendré une mobilité géographique croissante qui a eu pour résultat de faire adopter par les Etats des réglementations restreignantes (idée à retenir par le Plan d'action mondial) [par.16].

(2) Enquête par sondage pour mesurer le flux des migrants au passage des frontières et relever certaines caractéristiques de base (par. 18).

(3) Coupler les documents d'entrée et de sortie quand cela est possible (par. 19).

(4) Priorité à l'amélioration des questionnaires de recensement pour étudier les migrations internationales sans compliquer toutefois exagérément les questionnaires (par. 20).

(5) Utiliser les recensements pour des enquêtes longitudinales par sondage sur les migrants (par. 20).

(6) Estimer les migrations irrégulières en s'efforçant de porter le moins possible préjudice aux droits des migrants (par. 21).

(7) Une méthodologie raffinée pour étudier les migrations est prête. Pour l'appliquer, il faut avoir des données sur la durée de séjour des migrants, de telle sorte que les "histoires" migratoires puissent être établies par cohorte (par. 22).

(8) Perfectionner les modèles de représentation des migrations internationales, en particulier dans le cadre de pays ayant des systèmes politiques et économiques intégrés (par. 23 et 24).

(9) Recherche, au niveau individuel, sur la décision d'émigrer (par. 25 et 26).

(10) Analyse des politiques et de leurs déterminants dans le domaine des migrations internationales (par. 27).

(11) Rercherches empiriques comparées sur les déterminants de la décision d'émigrer dans des systèmes culturels différents (par. 27).

(12) Etude de la structure (politique, économique, démographique, etc.) des pays de départ et son influence sur les migrations internationales (par. 27).

(13) Meilleure évaluation de la croissance démographique comparée des pays de départ et d'arrivée et son impact sur le volume de la migration (par. 27).

(14) Evaluer l'importance de l'"exode des cerveaux" (par. 29 à 31).

(15) Meilleures définitions des besoins des pays en voie de développement en personnel qualifié (par. 29 à 31).

(16) Etudes de la possibilité d'adopter des mesures de compensation pour atténuer les effets de l'exode des cerveaux (par. 29 à 31).

(17) Meilleure connaissance des aspects économiques de la migration internationale, et plus particulièrement (par. 44) :

(*a*) Etudes comparatives des politiques démographiques, économiques, sociales et migratoires Mise en évidence des contradictions entre ces diverses politiques;

(*b*) Les limites de remplacement des migrations par le commerce et le transfert de capitaux;

(*c*) Effet de l'émigration sur le développement social et économique du pays d'origine;

(*d*) Projection à long terme des besoins et des disponibilités de main-d'œuvre.

(18) Relation directe entre la migration internationale et les autres variables démographiques, et plus particulièrement les études suivantes (par 48, *a*);

(*a*) Effets sur la nuptialité;

(*b*) Effets sur la fécondité des migrants,

(*c*) Effets comparés des migrations internes et internationales sur la fécondité,

(*d*) Effets sélectifs des migrations internationales,

(*e*) Analyse des migrations internationales en utilisant le concept d'années vécues au dehors par migrant;

(*f*) Analyse des migrations internationales en utilisant des taux différents des taux classiques

(19) Relation entre la migration internationale et les changements économiques et sociaux, et plus particulièrement les points suivants (par. 48 *b*,):

(*a*) Effets rétroactifs de la migration,

(*b*) Le rôle de démonstration des migrants de retour,

(*c*) Les effets de la migration sur l'état social et économique des femmes,

(*d*) Les effets sur la fécondité de la répartition des migrants selon la résidence urbaine ou rurale;

(*e*) Les effets de la migration sur la mobilité économique, professionnelle, sociale, dans une génération et entre générations.

(20) Est-il réaliste de supposer que la société d'accueil acceptera des immigrants qui n'accepteront aucune évolution culturelle (par. 52) ?

(21) Le caractère évolutif des migrations internationales rend-il l'assimilation plus difficile (par. 52) ?

(22) Etude de la tolérance de la société d'accueil pour les migrants qui s'assimilent et de l'intolérance à l'égard des autres migrants (par. 56)

(23) Importance de la politique du pays d'accueil pour une bonne intégration des migrants. Nécessité de définir cette politique en liaison avec les migrants eux-mêmes (par. 52).

(24) Etudes des systèmes de normes et de valeurs dans la société d'accueil. Faut-il s'efforcer de modifier les systèmes pour faciliter l'intégration des migrants (par. 52) ?

(25) Fixation du nombre des migrants et de la structure (culturelle, économique, sociale) du flux migratoire permettant de maximiser les possibilités d'intégration des migrants (par. 52).

(26) Les conséquences sociales dans le pays de départ doivent être étudiées en liaison avec l'expérience des migrants acquise dans le pays d'accueil (par. 53 à 55)

(27) Mise au point de techniques aptes à mesurer et à décrire le flux et les caractéristiques des migrations de retour (par 56).

(28) Motivations extérieures et personnelles des migrations de retour (par. 56).

(29) Etude du montant et de l'utilisation des transferts d'argent et plus généralement de l'épargne des migrants de retour (par 56)

(30) Etude de la réintégration économique et sociale du migrant de retour (par. 56)

(31) Etude des politiques du pays de retour en ce qui concerne les émigrants et les retours de ces émigrants (par. 56).

(32) Etudes permettant d'identifier les différents types d'obstacles à la libre circulation des migrants (par. 57 à 59).

(33) Prendre le Marché commun européen comme référence pour étudier le problème de la libre circulation dans d'autres ensembles régionaux (par. 57 à 59).

(34) Transformer le CIME en une véritable organisation internationale non gouvernementale chargée de surveiller, d'organiser et d'étudier les mouvements migratoires (par 60).

(Les trois sujets précédents pourraient être retenus par le Plan d'action mondial sur la population)

(35) Organiser une véritable formation de praticiens des migrations internationales (par. 61).

(36) Etude des problèmes juridiques posés par les migrations professionnelles (par 61).

(37) Analyse démographique des migrations professionnelles (par. 61).

Considérations générales

12. Le présent rapport a essentiellement pour but de dégager les priorités de recherche et les besoins de la recherche tels qu'ils se sont révélés, tant dans les conclusions des différents documents de base qu'à la suite des discussions pendant les différentes séances du séminaire.

13. La nature du sujet du séminaire — les migrations internationales — implique qu'un large éventail de facteurs sociaux, économiques et politiques soit pris en considération en complément des aspects démographiques des migrations internationales. En vérité, les discussions ont souvent été axées sur les implications plus générales des migrations internationales, dé assant les considérations de pure démograph'

14. Bien que les migrations internationales se soient considérablement développées au cours de la dernière décennie, elles n'ont plus l'importance qu'elles avaient dans le passé en tant que facteur de redistribution de la population à travers les pays et les continents. Des entraves plus ou moins rigides pour le contrôle des migrations internationales ont été établies presque partout dans le but de réglementer le flux des immigrants. D'une manière générale, cela signifie que les pays disposent de mécanismes appropriés pour contrôler la vague des immigrants (beaucoup moins pour les émigrants) en assouplissant ou renforçant la réglementation. Les politiques de migrations ont, donc, un rôle décisif dans la manière de déterminer les migrations internationales.

15. D'un autre côté, cependant, il existe d'autres forces actuellement ou potentiellement à l'œuvre poussant au développement de la redistribution de la population sur le plan international. Ce sont les différences entre les pays en termes de développement socio-économique, les écarts très sensibles entre les taux d'accroissement de la population et la facilité de plus en plus grandes des déplacements. En dépit d'une stricte réglementation, une immigration irrégulière massive n'est pas un phénomène rare dans beaucoup de pays développés ou en voie de développement. Ces pressions se trouvent aussi empreintes de considérations politiques, en relation avec le fait que les frontières politiques ne coïncident pas toujours avec les facteurs culturels, linguistiques, ethniques ou religieux qui sont déterminants pour la cohésion d'un ensemble démographique.

16. En conséquence, la double disparité économique et démographique, d'un côté, et la pression politique, de l'autre, sont des facteurs puissants, latents ou patents, de la redistribution de la population. Le développement a engendré une mobilité géographique croissante. Sur le plan international, cette propension à la mobilité a provoqué la mise en place de réglementations nationales qui, dans certains cas, ont eu pour effet de réduire la mobilité effective. Une telle situation doit être admise par la communauté internationale et ses implications doivent être prises en compte dans le "plan mondial d'action" que la prochaine conférence mondiale de la population doit discuter.

Mesure des migrations internationales

17. La séance consacrée à la mesure des migrations internationales a montré la détérioration de la statistique des migrations au cours du dernier demi-siècle. A cela il y a deux explications : d'une part, l'évolution des modalités de transport et l'importance numérique des points de passage aux frontières où, dans la mesure où aucune formalité bureaucratique n'est exigée, il est difficile d'identifier et de mesurer d'une manière adéquate les migrants dans la masse des voyageurs; d'autre part, la typologie des migrations s'est diversifiée : aujourd'hui, le migrant peut se situer dans un continuum qui va du migrant qui s'établit d'une manière permanente jusqu'à celui qui entre et sort chaque jour.

18. D'une manière générale, on a reconnu que les statistiques des passages aux frontières, bien qu'étant la source principale et relativement exacte de l'information sur les migrations internationales, ne pouvaient guère être améliorées. Mais il est bien clair que le passage de la frontière fournit la seule occasion de mesurer et de contrôler les courants migratoires. Aussi, indépendamment des améliorations qu'il est possible d'apporter à la collecte des données au passage des frontières et de l'harmonisation des statistiques internationales, est-il éminemment souhaitable que des enquêtes par sondage soient entreprises pour mesurer les flux des migrants traversant les frontières et de relever dans ces enquêtes les caractéristiques de base de ces migrants.

19. Dans certains cas, il doit être possible de coupler les documents d'entrée et de sortie des migrants, ce qui permettrait de mesurer la durée de séjour et de distinguer la nature des divers déplacements (tourisme, affaires, travail, etc.). Les registres de population qui représentent une source précieuse de renseignements sur les migrations internes paraissent assez mal adaptés à l'étude des migrations internationales. Ils ne peuvent fonctionner que dans des pays ayant une organisation administrative fortement structurée et ne constituent pas un outil adapté à l'amélioration des statistiques sur les mouvements migratoires. L'enregistrement des étrangers, pour des raisons administratives (permis de résidence ou de travail), ne peut être utilisé à des fins statistiques que dans un petit nombre de pays.

20. Il y a eu un accord général pour affirmer qu'une amélioration décisive des statistiques de migration ne pouvait venir que des recensements et des enquêtes. La priorité devrait par conséquent être donnée à l'amélioration des questionnaires de recensement, et cela bien que l'expérience ait montré qu'il était difficile d'aller au-delà des questions sur le lieu de naissance et la durée de résidence [1] et l'amélioration des tableaux croisant les réponses à ces questions avec d'autres caractéristiques (démographiques, économiques, sociales, etc.). Toutefois, les projets actuellement en cours en Amérique latine sur l'harmonisation des questionnaires et des tabulations des recensements devraient améliorer grandement nos connaissances. Les recensements devraient aussi permettre des enquêtes longitudinales par sondage qui conduiraient à une analyse plus fine du phénomène migratoire.

21. Les enquêtes par sondage sont les seules à pouvoir être utilisées pour mesurer les flux migratoires là où il n'y a pas de recensement, ou encore dans l'intervalle entre les recensements. Toutefois, le séminaire a constaté qu'assez peu de renseignements sur les migrations ont été obtenus jusqu'ici dans les enquêtes par sondage, et les quelques données recueillies ont été des sous-produits des enquêtes plutôt que des résultats correspondant aux objectifs fondamentaux de ces enquêtes. La migration est un événement relativement rare, et la taille de l'échantillon doit être très importante pour

[1] A ce propos, l'utilité de questions sur l'année d'entrée dans le pays a été soulignée.

donner des résultats significatifs. C'est là un sérieux obstacle pour l'utilisation des enquêtes par sondage. Les enquêtes à passages répétés donnent aussi des renseignements sur les flux migratoires, à condition que des techniques appropriées soient utilisées pour éliminer le "biais" systématique entraîné par l'omission des ménages qui arrivent ou s'en vont dans l'intervalle de deux passages (il est conseillé à ce propos d'utiliser des sondages aérolaires). Enfin, il est bon de signaler qu'une part importante des migrations internationales est en fait illégale, et, quel que soit le moyen utilisé pour mesurer ces migrations, les résultats seront d'autant plus défectueux que les sanctions condamnant les situations irrégulières seront fortes. Aussi, tous les efforts visant à estimer les migrations irrégulières, sans porter préjudice aux droits des migrants, doivent-ils recevoir une haute priorité.

22 La méthodologie utilisée dans l'étude des migrations n'est en retard qu'en apparence et est due à la mauvaise qualité des données. Le séminaire a affirmé nettement que des méthodes plus perfectionnées seraient utilisées dès que les données de base fiables deviendraient disponibles Pour atteindre ce résultat, il faudrait connaître la durée de séjour des migrants dans chaque zone géographique, de telle sorte que les histoires migratoires par cohorte puissent être établies d'après les zones de destination

Déterminants et mécanismes de la migration

Modèles

23. La session consacrée aux causes et aux mécanismes de la migration a fait l'objet de controverses et a montré que, dans ce domaine, il y avait encore beaucoup de recherches à faire. Trois sujets principaux ont orienté la discussion : la pertinence des modèles de migration interne pour représenter les migrations internationales, les facteurs économiques et non économiques des migrations internationales et les causes de l'"exode des cerveaux".

24. Il s'est dégagé l'impression générale que les modèles de représentation des migrations internes ne peuvent, sans adaptations majeures, s'appliquer à l'étude des migrations internationales Deux raisons essentielles ont été données : la première (et la plus générale) ressort de la notion selon laquelle le facteur politique est une variable exogène importante dont la signification et l'influence sont imprévisibles. La seconde est que la faiblesse des données sur la migration et leur manque d'homogénéité sur le plan international fournissent une base fragile à la construction de modèles En d'autres termes, bien qu'il existe tout un corps de chercheurs très habiles dans l'établissement des modèles, leur construction est de peu d'utilité étant donné la mauvaise qualité des données. L'accord dans ce domaine n'est pas unanime; on a observé en fait que si la contrainte politique sur la migration est très forte, il est également vrai que la migration intervient principalement pour des raisons économiques (dans le sens le plus large); le cadre politique reste quelquefois constant dans le temps et peut être logiquement incorporé dans le modèle avec d'autres variables qui entrent en ligne de compte. Les migrations internationales sont parfois une prolongation des migrations internes; les données peuvent être améliorées. Les recherches pourraient progresser dans ce domaine, en particulier si les efforts étaient concentrés sur des pays qui échangent de la main-d'œuvre, dans le cadre de systèmes politiques et économiques intégrés.

Facteurs économiques et non économiques

25 Une discussion dans le même esprit s'ensuivit lorsque les participants s'attachèrent aux facteurs économiques et non économiques des migrations internationales L'idée a été émise que les théories économiques actuelles sur les causes de l'émigration ne sont qu'une variation de celles proposées dans le passé, selon lesquelles des décisions individuelles d'émigrer étaient "expliquées" par des hypothèses irréalistes, telles que. la migration individuelle libre est déterminée par un auto-intérêt économique du migrant qui coïnciderait avec l'intérêt général En d'autres termes, l'approche macro-économique ne peut expliquer les mécanismes complexes, en grande partie de nature psychologique et sociale, du processus de la décision d'émigrer. D'autres recherches au niveau individuel sur les décisions d'émigrer ont été fortement recommandées, recherches qui devraient tenir compte de la nécessité d'étudier le comportement individuel sur une base comparative

26. Le fait de distinguer les facteurs économiques de migration des facteurs politiques a été considéré comme dépourvu de toute valeur heuristique pour orienter la recherche Celle-ci doit suivre une approche complexe historique, en considérant soigneusement le niveau des ressources, celui de l'industrialisation et les conditions [illegible]

tels que la nature du système — capitaliste, socialiste ou mixte —, l'orientation de la planification et la politique à appliquer dans les régions les moins développées du pays, la situation politique générale, etc Seule cette approche complète se référant aux facteurs économiques, politiques et démographiques peut conduire, selon certains, à une interprétation satisfaisante des mouvements migratoires

27. On ne peut facilement définir les recherches prioritaires étant donné la complexité de la discussion. Mais l'insatisfaction était évidente, en raison d'une approche limitée à un seul aspect du problème migratoire et de la faiblesse des recherches empiriques actuelles.

28. Cependant, les thèmes suivants peuvent être considérés comme prioritaires :

(*a*) L'analyse des politiques, et leurs déterminants, dans le domaine des migrations internationales;

(*b*) Recherches empiriques [illegible] arée [illegible] rnationales sur les déterminants [illegible] r;

(*c*) Une étude plus large de la structure (politique, économique, démographique, etc.) des pays de départ comme fondement préalable à toute interprétation microsociale ou macrosociale;

(*d*) Une meilleure évaluation de la croissance démographique comparée des pays de départ et d'arrivée et de son impact sur le volume de la migration.

Exode des cerveaux

29. Pendant la même séance, il y a eu un large échange de vues sur les déterminants du *brain-drain* ou, plus précisément, de la migration internationale des travailleurs hautement qualifiés et de techniciens. Les intervenants sont tombés d'accord pour considérer que le problème était urgent pour les pays sous-développés de départ. Ils sont également tombés d'accord sur l'importance du problème de la migration hautement qualifiée à partir de l'Asie, de l'Amérique latine et de l'Afrique, bien que l'évaluation chiffrée du phénomène donne lieu à discussion.

30. Dans ce domaine, les priorités de recherche semblent être les suivantes :

(*a*) Une étude de l'importance du problème. Cette étude apparaît relativement facile à conduire à partir des archives universitaires des pays de départ et des pays d'arrivée et compte tenu de la faiblesse relative des effectifs concernés. L'analyse des motivations pourrait être effectuée à partir de comparaisons internationales en tenant compte des écarts de revenus, de la durée de séjour à l'étranger, des liens avec le pays d'origine et des projets d'avenir. L'état d'avancement de la recherche dans les divers pays doit également être pris en compte. Cela devrait permettre de déterminer l'impact de ce type particulier de migration sur les pays de départ et d'arrivée — dans ses aspects négatif et positif;

(*b*) Une meilleure définition des besoins des pays en voie de développement en matière de personnel très qualifié, en vue d'une planification plus efficace de l'enseignement supérieur et de la formation de travailleurs qualifiés. Cela comprend les projections à long terme des besoins en personnel qualifié, l'étude des mesures de réallocation des ressources par la migration entre les pays en voie de développement, pour atténuer l'excédent de l'offre dans l'un des pays et l'insuffisance dans l'autre, etc.;

(*c*) L'étude des mesures de compensation de toutes natures qui doivent être mises en place par les pays récepteurs en faveur des pays de départ, et en particulier l'atténuation des politiques sélectives de nombreux pays d'arrivée, tendant à favoriser l'immigration de personnels qualifiés et à empêcher l'immigration des non qualifiés. Cela est probablement un facteur essentiel qui s'insère plus généralement dans les politiques de migration.

31. L'étude des meilleurs moyens à utiliser par les pays de départ pour favoriser le retour de leurs émigrants les plus qualifiés est aussi un thème de recherche à développer.

Migrations internationales et le processus du développement économique

32. Les relations entre les migrations internationales et le processus du développement économique ont été traitées dans une autre séance, où la discussion s'est articulée autour de trois principaux thèmes : la migration, le marché du travail et la théorie de la croissance économique; la migration et le développement économique; la migration et la théorie du commerce international. La discussion a été centrée, en particulier, sur les effets des migrations sur la croissance, à la fois pour les pays de départ et les pays d'accueil, et les possibilités de substitution entre l'exportation du capital et l'importation du travail.

33. Le rôle historique joué par l'immigration dans le développement économique de nombreuses régions du globe a été très largement reconnu. L'on a aussi généralement admis que l'immigration, qui n'est certes pas irremplaçable, a néanmoins constitué un moyen très efficace et très rapide pour utiliser l'accumulation croissante des capitaux dans les pays développés. Dans certains cas, l'immigration a même pu accélérer le mouvement d'accumulation du capital et a retardé le processus de réduction des taux différentiels de salaire et dans la mesure où elle a maintenu le niveau général des salaires à un taux faible par rapport au profit élevé réalisé par les employeurs.

34. Bien qu'il ne soit pas possible ici de résumer le raisonnement de la théorie économique dont les documents de base donnent une bonne vue d'ensemble, il est apparu évident que l'immigration a accéléré le processus de croissance dans de nombreux pays développés. Cela s'applique non seulement aux mouvements migratoires libres, mais aussi à ceux qui sont provoqués par des motifs politiques, comme l'exemple de la République fédérale d'Allemagne ou d'Israël le laisse supposer.

35. Il a également été remarqué que les régions qui comparativement sont les plus développées ont commandé l'intensité des migrations internationales, à la fois en raison du déficit de leurs besoins en main-d'œuvre locale et parce qu'elles ont conservé le pouvoir de contrôler la dimension et la structure du flux migratoire. Il existe cependant des impératifs qui pourront provoquer dans l'avenir un changement d'attitude des pays d'accueil. Ces derniers ont de plus en plus tendance, en effet, à reconnaître la nécessité de stabiliser le taux de croissance de leur population à un niveau modeste, et même, parfois, à envisager un état stationnaire. La question de savoir si de tels objectifs peuvent être atteints est un sujet d'interrogation; mais la question cruciale est de savoir si les pays développés seront capables d'accepter les conséquences sociales et économiques qu'entraînerait une population stationnaire, voire une main-d'œuvre stationnaire. Ces conséquences sont nombreuses et font l'objet de discussions parmi les sociologues et les économistes : effets sur la croissance des salaires et le coût du travail en général,

le taux d'inflation; les changements dans la manière de consommer et le style de vie, une modification des investissements à l'égard des secteurs capitalistes intensifs, etc. Si les pays développés acceptaient ces conséquences, il se pourrait alors que, à long terme, les migrations internationales vers ces pays se trouvent réduites d'une manière substantielle.

36 Mais, si le taux de croissance de la population devenait négatif, et le restait pendant longtemps, les pays développés seraient contraints, pour éviter une détérioration de leur niveau économique, d'accepter encore l'immigration.

37. Dans la seconde hypothèse, il se pourrait également que les conséquences d'une situation stationnaire ne puissent être acceptables, en totalité ou en partie, et que l'immigration puisse alors se poursuivre dans l'avenir. Dans les deux cas, les pays développés ont à se préoccuper de l'immigration — comme certains [illegible]

coût total que cela entraîne du point de vue social et économique

38 A partir de ce cadre hypothétique, la discussion a mis en lumière plusieurs points controversés L'opinion soutenue par certains selon laquelle l'exportation du capital peut être considérée comme se substituant parfaitement à l'importation du travail n'a pas été admise par la majorité des participants.

39 Même en se plaçant d'un point de vue théorique, il a été mis en doute qu'une telle substitution soit réalisable dans certains secteurs de l'économie tels que l'industrie du bâtiment ou encore une grande part du secteur tertiaire.

40. De nombreuses personnes ont observé le fait suivant : même en admettant qu'un pays puisse entièrement ou partiellement substituer la main-d'œuvre étrangère au transfert de capital, il est très probable que le capital ira là où les investissements sont les plus profitables, et pas nécessairement vers les pays en voie de développement De plus, bien que d'un point de vue purement [illegible]

un impact important et rendre les investissements étrangers indésirables pour les pays en développement Des négociations sur les conditions dans lesquelles les capitaux étrangers peuvent être investis peuvent toutefois fournir des solutions valables aux problèmes rencontrés dans divers pays. Dans l'ensemble, les pays en développement ne peuvent certainement pas freiner le flux des émigrants dans l'attente de nouveaux investissements étrangers. Ce fait prouve une fois de plus que la direction et l'intensité d'une grande partie des migrations internationales sont commandées surtout par les politiques des pays industriels

41. Le séminaire a prêté grande attention aux "micro" aspects économiques du problème qui sont écartés par l'approche globale. On a observé que les migrations temporaires et répétées en provenance de régions moins développées ne favorisent pas les intérêts à long terme des migrants Ceux-ci s'en vont souvent avec l'espoir de revenir un jour dans leur pays d'origine; ils s'efforcent de rendre maximum leurs gains en travaillant au delà des heures normales, ils négligent leur promotion sociale et professionnelle, ils n'ont pas la chance de bénéficier de contacts normaux avec la société hôte.

42 A leur retour, ils peuvent rarement utiliser la formation professionnelle qu'ils ont pu acquérir Une telle migration favorise les intérêts à court terme des migrants, et il se trouve que les pays d'accueil ont aussi un intérêt dans une main-d'œuvre très mobile, demandant une infrastructure bon marché, et qu'il est relativement facile de renvoyer dans son pays d'origine en cas de récession économique

43 L'immigration temporaire et répétitive ne représente [illegible]

d'une manière semi-permanente ou permanente, avec toutes les combinaisons possibles de caractéristiques que cela entraîne du point de vue social, professionnel ou démographique Dans certains cas, la migration se fait suivant les procédures légales, dans d'autres elle est illégale. Il difficile de généraliser et peut-être n'y a-t-il pas lieu de le faire, étant donné la connaissance insuffisante que l'on a du sujet, mais dans chaque cas il est nécessaire de connaître les conditions selon lesquelles l'émigration peut contribuer aux aspirations à long terme des migrants et servir à leur promotion sociale, économique et professionnelle

44. Il n'est pas facile d'isoler des priorités de recherche de caractère démographique Cependant, l'analyse des implications économiques de la migration est essentielle pour l'interprétation pertinente de ses caractères démographiques A cet effet, les priorités de recherches sont les suivantes

(*a*) Etude comparative des politiques démographiques, économiques et migratoires Les contradictions entre les trois types de politiques sont à mettre en lumière, particulièrement en ce qui concerne les conséquences d'une population active stationnaire ou quasi stationnaire, le caractère plus ou moins acceptable de ces conséquences, et les attitudes qui peuvent en résulter à l'égard des migrations,

(*b*) Jusqu'à quelle limite le flux des biens et des investissements entre les pays développés et les pays en voie de développement peut se substituer, partiellement [illegible]

des populations et les niveaux socio-économiques respectifs entre les pays;

(*c*) Analyse des effets de l'émigration sur le développement social et économique du pay[illegible]igine. Des situations diverses se [illegible] ?ys d'[illegible]

gration selon le niveau de développement, l'intensité du flux migratoire et les caractéristiques des migrants, la densité de la population, etc. Il n'est donc pas possible à nouveau de généraliser. Toutefois, les responsables de la planification ont besoin de savoir dans quelles conditions une émigration peut aider au développement économique et social, ou au contraire être un frein pour la société de départ. De bonnes études nationales d'ensemble seraient très utiles et des thèmes variés devraient être étudiés, comme par exemple l'usage des transferts monétaires en provenance des migrants, l'influence des migrants de retour, les structures démographiques au-delà desquelles le départ de nouveaux migrants entraîne la dislocation de la communauté d'origine, etc.;

(*d*) Des projections à long terme des besoins et des disponibilités en main-d'œuvre dans des pays situés à des niveaux différents de développement et appartenant à une même aire géographique, avec pour objectif d'évaluer la force des pressions en faveur d'une redistribution de la main-d'œuvre.

IMPLICATIONS DÉMOGRAPHIQUES DES MIGRATIONS INTERNATIONALES

45. La séance sur les implications démographiques des migrations internationales était fondée sur deux rapports de base sur les effets de l'émigration sur la structure par âges et par sexes des pays d'émigration et d'immigration et, de ce fait, sur leur fécondité potentielle.

46. Le premier de ces deux rapports examinait la possibilité d'émigration, comme une politique de population alternative à la réduction de la fécondité; l'autre évaluait les effets à moyen et long terme de l'émigration sur la structure par âges et par sexes de la population d'un pays d'émigration sous deux types différents d'émigration et une hypothèse sur la fécondité et la mortalité.

47. On peut tirer au moins trois conclusions de ces rapports et de la discussion. En premier lieu, l'efficacité de l'émigration comme substitut d'une baisse de fécondité est limitée par plusieurs facteurs : l'émigration doit être massive pour affecter de façon significative le taux d'accroissement; pour rendre maximum l'effet de réduction de la migration sur la fécondité, la migration doit être composée de femmes très jeunes en âge de procréer (15 à 19 et 20 à 24 ans); on ne peut attendre aucun changement à long terme de la fécondité si les femmes émigrantes ont dépassé l'âge de procréer. En second lieu, l'émigration peut modifier de façon significative la structure par âges et par sexes de la population si la mobilité est massive et plus particulièrement si cette mobilité est spécifique de certains âges et sexes. En troisième lieu, bien que l'émigration conduise à une réduction du taux d'accroissement, elle entraîne toujours une structure par âges moins avantageuse — du point de vue économique et social — que celle qu'on aurait obtenue sans émigration.

48. Les auteurs des rapports, les personnes qui ont participé à la discussion et les délégués, ont fait de nombreuses suggestions de recherche, principalement dans les deux grandes directions suivantes :

(*a*) Relation directe entre la migration internationale et les autres variables démographiques;

(*b*) Relation entre la migration internationale et le changement social et économique; changement qui, à son tour, modifie d'autres variables démographiques.

49. Les principales suggestions pour la recherche à venir sont résumées ci-dessous :

(a) *Relation directe entre la migration internationale et les autres variables démographiques :*

(i) Quel est l'effet de la migration sur la nuptialité (plus spécialement sur le taux de célibat définitif et sur l'âge au mariage) dans les populations de départ et d'arrivée ?

(ii) Quel est l'effet de la migration sur la fécondité des migrants ? S'il y a un effet, au bout de combien de temps se fait-il sentir ?

(iii) Quelle est la relation entre la migration interne et la migration internationale ?

(iv) Comportement différentiel des migrants : comment la migration est-elle "sélective" ? Si les migrants ont une fécondité plus basse (biologiquement et/ou psycho-sociologiquement) ou si une plus forte proportion de migrants, rapportés aux non-migrants, sont célibataires, ou si les migrants ont une fécondité plus grande que les populations des zones d'accueil, comment le taux d'accroissement naturel des zones d'émigration et d'immigration en est-il affecté ?

(v) Que résulte-t-il si l'effet de la migration sur la structure par âges et sexes est calculé en termes d'années vécues par les individus hors de la région d'émigration, plutôt qu'en termes de migration nette ?

(vi) Que résulte-t-il si l'on utilise des taux différents des taux classiques pour mesurer la migration ? Par exemple, quels résultats obtiendrait-on si l'émigration était calculée en termes de femmes migrantes en âge de procréer, en utilisant comme dénominateur toutes les femmes en âge de procréer ?

(*b*) *Relation entre la migration internationale et le changement social et économique*, changement qui, à son tour, modifie d'autres variables démographiques :

(i) "L'effet rétroactif" de la migration : comment la migration est-elle liée aux changements sociaux et économiques, eux-mêmes liés aux modifications de la fécondité et de la mortalité ? La migration contribue-t-elle au changement social et économique et par là même modifie-t-elle la fécondité ? La migration conduit-elle en elle-même à des changements de fécondité, ou la "modernisation" est-elle, à la fois, cause de la migration et des changements de fécondité ? Comment les structures par âges et par sexes des pays d'émigration et d'immigration affectent-elles le niveau de la demande effective, entraînant ainsi un changement économique, qui induit à son tour un changement de fécondité ?

(ii) Quel est "l'effet de démonstration" des migrants de retour ? La fécondité des zones d'émigration en est-elle modifiée ?

(iii) Comment la migration affecte l'état social et *économique des femmes et, dès lors, leur fécondité ?*

(iv) Comment la répartition entre les résidences rurales ou urbaines des migrants affecte leur fécondité ?

(v) Comment la migration affecte la mobilité économique, professionnelle et sociale (à l'intérieur d'une génération, ou entre les générations) et, du même coup, la fécondité ?

MIGRATIONS ET SOCIÉTÉ

50. Une session a été consacrée au problème "migrations et société". Trois sujets furent traités : migration et relations ethniques; migration et développement social, migration de retour En réalité, les trois sujets sont étroitement liés et il n'est pas possible de les traiter séparément.

51. Pour les sociétés d'immigration, les mécanismes et les causes de l'ajustement, de l'intégration et de l'assimilation sont essentiels pour toute organisation et évaluation du processus d'évolution sociale. Ces mécanismes sont déterminés d'une part par l'attitude de la société d'accueil et par sa structure institutionnelle et sociale, d'autre part par les caractéristiques de l'immigration (démographiques, culturelles, ethniques, etc) En réalité, certaines sociétés d'accueil peuvent exiger l'assimilation totale des migrants, tandis que d'autres demandent une intégration ou un ajustement fonctionnel. Il s'est avéré que la solution ne pouvait être uniforme La question n'est pas de savoir comment trouver une prescription valable pour tous les cas, mais de déterminer les conditions dans lesquelles l'immigration favorisera au mieux l'intérêt des migrants et de la société d'accueil.

52 Un certain nombre de points ont été soulevés dans ce domaine D'abord, il a semblé irréaliste à certains de supposer que la société d'accueil accepte une installation véritable des immigrants non accompagnée d'une évolution de leurs caractéristiques culturelles. Deuxièmement, le caractère évolutif des migrations internationales rend également difficile une assimilation totale des migrants. Troisièmement, l'attitude de la société d'accueil peut être tolérante à l'égard des immigrants qui souhaitent s'assimiler et intolérante envers *ceux qui désirent conserver tout ou partie de leur* identité culturelle. Quatrièmement, la politique du pays d'accueil peut jouer un rôle utile en facilitant les relations entre les immigrants et la société d'accueil; cependant, cette politique doit être mise en œuvre avec la participation de la communauté des migrants. Cinquièmement, une partie des tensions qui résultent de l'immigration sont implicites dans le système de normes et de valeurs de la société d'accueil, un effort doit être *fait pour déterminer dans quelle mesure le système doit* être modifié. Sixièmement, il paraît important de déterminer les conditions structurelles de l'immigration (nombre, âge, sexe, état matrimonial, situation de famille, type d'installation, etc.), en maximisant les chances de satisfaire les aspirations des migrants et de la société qui reçoit Tous ces points peuvent faire l'objet de *recherches prioritaires.*

53 Les changements sociaux apportés par l'émigration et par le retour des migrants dans leur pays d'origine sont de la plus haute importance. Malheureusement nos connaissances en ce domaine sont encore rudimentaires, notamment pour ce qui concerne les causes et les conséquences des migrations de retour Les documents de base et les rapports des discutants donnent une vue très claire des problèmes et des recherches qu'il serait nécessaire d'effectuer dans ce domaine. L'émigration, en particulier lorsque le migrant continue à entretenir des relations étroites avec son pays d'origine, amène de nouveaux modèles de comportement, change les modes de vie, les habitudes dans la manière de consommer, et même les préférences politiques Nombreux sont ceux qui pensent que l'influence de l'émigration sur le pays d'origine est de loin plus importante du point de vue social que du point de vue économique

54. Cependant, la qualité de cette influence est probablement fonction de la qualité de l'expérience du migrant à l'étranger En ce sens, toute étude des conséquences de l'émigration dans le pays de départ doit être effectuée en étroite coordination avec l'étude de l'expérience du migrant dans le pays hôte. Des raisons techniques évidentes rendent les recherches dans ce domaine *extrêmement rares et difficiles, cela est cependant prioritaire* si l'on veut porter un jugement de valeur objectif sur les migrations

55. Si les statistiques sur les migrations sont pauvres, celles concernant le retour des migrants sont très [illegible]

les domaines éducatif, professionnel et monétaire On sait mal ce que la société de départ peut gagner de l'expérience du migrant à l'étranger, cela dépend beaucoup de l'existence d'une politique efficace Les migrants revenus au pays ont pu acquérir une instruction, de l'habileté et de l'argent, mais ils peuvent être contraints d'utiliser ces avantages dans des activités à faible productivité (par exemple dans certains domaines des secteurs primaire et tertiaire) si les occasions d'emplois et d'investissements font défaut.

56 Les recherches prioritaires couvrent pratiquement la totalité du processus d'immigration de retour. Cinq points principaux peuvent être mentionnés ici :

(*a*) L'attention doit se porter sur la mise au point de techniques aptes à mesurer et à décrire le flux et les caractéristiques des migrations de retour. A partir de là seulement peut être tentée une typologie de la migration de retour;

(*b*) *Il faut procéder à une investigation des motivations* extérieures et personnelles du retour; cela est important, non seulement en soi [illegible] is aus [illegible] évaluer

les politiques concernant les migrations, à la fois du pays de départ et du pays d'accueil;

(c) L'on doit améliorer les connaissances sur le montant des envois de fonds des migrants et le montant de leurs économies ainsi que sur l'utilisation qui en est faite. Il est évident que dans certains pays, ces fonds sont principalement affectés à l'acquisition de biens de consommation, ou de terrains et propriétés; mais les situations peuvent différer beaucoup d'un pays à l'autre.

(d) L'on doit aborder le problème de la réintégration économique et sociale du migrant, et cela n'est possible qu'à travers les données de la connaissance systématique des points précédents;

(e) La politique du pays d'origine pour ce qui concerne les migrations de retour en liaison avec la politique d'émigration doit être étudiée et appréciée soigneusement de manière à relever et à corriger les nombreuses contradictions et inconséquences existantes.

Droit à la migration

57. Une séance a été consacrée aux problèmes de la distribution mondiale de la population vue sous l'angle des migrations, et trois thèmes ont été abordés : le droit à la migration, les modalités juridiques dans lesquelles s'effectuent les migrations, et les problèmes sociaux que posent les migrations. Il est bien clair que ce dernier sujet a des implications qui débordent largement le thème des migrations de travail auxquelles le séminaire était principalement consacré. C'est pourquoi des questions très importantes, comme celle des réfugiés et des problèmes qui lui sont liés (citoyenneté, expulsion, etc.), n'ont été examinées que de façon incidente.

58. Pour le droit à la migration, l'exemple du Marché commun européen a été largement discuté. Les débats ont montré que la liberté de mouvement exigeait non seulement le droit d'entrer et de sortir, mais également toute une série de mesures de nature à permettre une véritable installation du migrant dans la vie économique du pays d'accueil. Comme exemple de ces mesures, on peut citer l'équivalence des diplômes pour les travailleurs qualifiés. Il a été suggéré que soient entreprises des études permettant d'identifier les différents types d'obstacles à la libre circulation sur le plan législatif ou réglementaire.

59. L'exemple du Marché commun, où les conditions de départ étaient particulièrement favorables, souligne cependant les difficultés de réalisation d'une véritable libre circulation. Il peut cependant servir de référence pour l'analyse du problème dans d'autres ensembles régionaux. Le Plan d'action mondial sur la population pourrait retenir cette suggestion.

60. Une discussion s'est engagée sur les modalités juridiques de l'émigration et sur les problèmes posés par l'importance et le développement des migrations irrégulières. Les intervenants des divers pays ont souligné l'universalité du problème. Bien que les questions migratoires internationales intéressent plusieurs organismes tels que la Division de la population des Nations Unies, le Haut Commissariat des Nations Unies pour les réfugiés, l'Organisation internationale du Travail et la Commission économique pour l'Europe ainsi que diverses organisations non gouvernementales, il n'existait malheureusement aucune organisation internationale responsable à l'échelon mondial de la surveillance de l'organisation et de l'étude des mouvements migratoires. Le Directeur adjoint du CIME a mentionné la possibilité que son organisation subisse une transformation qui lui permette de s'adapter aux nouveaux courants migratoires et a souligné que la recherche pourrait alors jouer un rôle important. A cet effet, il a proposé une transformation de son organisation en vue de l'adapter aux nouveaux courants migratoires et il a souligné que la recherche devrait y avoir une place importante. Les participants ont suggéré que le Plan d'action mondial en débatte.

61. Les politiques d'action sociale en faveur des migrants ont fait l'objet d'un examen attentif. Différents aspects des conditions de vie des migrants ont été examinés. Différentes suggestions de recherche ont été faites. Les suggestions proposées dans les précédents paragraphes ne sont pas reprises ici :

(a) Prévoir une véritable formation des praticiens de la migration;

(b) Etude des problèmes juridiques posés par les migrations professionnelles;

(c) Analyse démographique des migrations professionnelles.

RECENT DEMOGRAPHIC TRENDS IN EUROPE AND THE OUTLOOK UNTIL THE YEAR 2000

Economic Commission for Europe

1. This paper incorporates the main findings of a larger and more detailed study on the same topic, which is being prepared by the Population Team of the General Economic Analysis Division of the Economic Commission for Europe (ECE), in co-operation with the Division of Social Affairs of the United Nations Office at Geneva and the World Health Organization (WHO), and with the financial assistance of the United Nations Fund for Population Activities (UNFPA). It is expected that the final report will be completed towards the end of 1974 and published early in 1975

2 The purpose of this abridged version is to provide a brief but comprehensive picture of recent and expected [illegible] lation Conference to be held at Bucharest in August 1974.

3. The share of Europe in total world population is small and shrinking It declined from 23 per cent in 1950 to less than 20 per cent in 1970, and it is likely to fall to less than 14 per cent by the end of the century (The corresponding figures for Europe outside the Union of Soviet Socialist Republics are about 16, 13 and 9 per cent, respectively)

4. Nevertheless, it is generally recognized that the study of demographic developments in Europe is of wider interest than to this region itself. It would appear that the developing areas of the world, particularly countries searching for means to contain their rates of population expansion, may have something to learn from the European experience, which includes experience in countries at various levels of economic and social development and with different economic and political systems. This applies also to the study of demographic causes and consequences of the recent decline of fertility in Europe, on which the present paper largely focuses The European scene may also be regarded as a laboratory for studying the economic, social and ecological consequences of declining rates of population growth These aspects are not, however, covered by the present analysis, except that some reference is made (in the section on migration) to the impact of recent demographic trends on the supply of labour.

5. The bulk of statistical data presented in this paper is derived from various issues of the United Nations *Demographic Yearbook* (including replies to the 1972 questionnaires, supplied through the courtesy of WHO) Some use was also made of the Statistical Office of the United Nations data bank for mortality statistics These sources were often supplemented by nationally published demographic statistics. The Secretariat also received valuable support from the Conference of European Statisticians and benefited—through the Statistical Division—from direct co-operation with a number of European Statistical Offices, particularly with respect to the supply of the still unpublished results of the 1970 population censuses. Moreover, the section on fertility includes some data obtained from a series of sample inquiries into fertility and family planning, undertaken in about a dozen European countries in the period 1966-1972. [1] The national statistical services were also helpful in supplying the Secretariat with sets of their latest population projections covering the period 1970-2000. However, for a few countries, such projections had to be prepared by the Secretariat for the specific purpose of completing the subregional totals.

6. It is generally accepted that the coverage and reliability of demographic statistics are of a higher standard in Europe than in other regions of the world, with the possible exception of North America Nevertheless, there are important intercountry differences in quality within Europe itself. Apart from the problems of intercountry comparability which affect most statistical series, the interpretation of recent temporal changes within individual countries is also subject to qualification In a short paper such as this, it is not possible to make all the necessary qualifications. Only a general warning can be sounded.

7. The layout of the paper follows the conventional pattern An introductory "overview" of changes in population size and structure is followed by a more detailed analysis of trends (and their determinants) in the three main components of population growth: fertility, mortality and migration. The last section of the paper provides a glimpse into the future as seen by the authors of national projections These views are critically evaluated in the light of recent trends.

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[1] [illegible] 12 national surveys"

TABLE 1. TOTAL POPULATION SIZE AND AVERAGE ANNUAL RATES OF GROWTH, BY SUBREGION, 1950-1970

Subregion [a]	Population size [b] (millions) 1950	1960	1970	Increment (millions) 1950-1970	Average annual rates of growth (per thousand) 1950-1960	1960-1970	1950-1970
Eastern Europe	88.5	96.9	103.1	14.6	9.1	6.2	7.6
Northern Europe	72.3	75.6	80.3	8.0	4.5	6.0	5.2
Western Europe	122.4	134.5	149.0	26.6	9.4	10.2	9.8
Southern Europe	108.4	117.5	128.2	19.8	8.1	8.7	8.4
Total Europe (excluding USSR)	391.6	424.5	460.6	69.0	8.1	8.2	8.1
USSR	180.1	214.3	242.8	62.7	17.3	12.4	14.8

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national sources.

[a] Subregions include the following countries:

Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.

Northern Europe: Denmark, Finland, Iceland, Ireland, Norway, Sweden, United Kingdom.

Western Europe: Austria, Belgium, France, Federal Republic of Germany, Luxembourg, Netherlands, Switzerland.

Southern Europe: Albania, Greece, Italy, Malta, Portugal, Spain, Yugoslavia.

[b] Mid-year populations (excluding Finland and Spain, for which census results of 1 December 1950, 1960 and 1970 were used).

8. Over-all growth rates and the incidence of mortality are analysed on a subregional rather than on a country-by-country basis. Where data are available, the latter approach is adopted for the analysis of nuptiality and fertility, which are the foci of the study. Migratory movements are considered for the few countries significantly affected by it. Future trends are again discussed on a subregional basis, but references are made to some intercountry variations in the assumptions concerning future trends in fertility and mortality.

9. Following the established practice of the United Nations Statistical Office, four subregions of Europe are distinguished: eastern, northern, western and southern (see table 1 for coverage). In contrast with the definitions adopted in the ECE publications, neither the Soviet Union nor Turkey are considered part of Europe for the purpose of the study. However, where available, data on the Soviet Union are shown separately.

10. The data that relate to the Federal Republic of Germany and the German Democratic Republic include the relevant data relating to Berlin for which separate data have not been supplied. This is without prejudice to any question of status which may be involved.

THE POPULATION OF EUROPE: AN OVERVIEW OF RECENT TRENDS

Population size and main components of population growth

11. The population of Europe (excluding the Soviet Union) rose from around 392 million in 1950 to around 460 million in 1970, i.e., by 69 million persons or by 17 per cent (see table 1). Over the same period, the population of the Soviet Union increased from 180 million to nearly 243 million, i.e., nearly 63 million persons or by 35 per cent. Within the European total, Western Europe experienced the fastest average rate of growth (9.8 per 1,000 per annum) and Northern Europe the slowest (5.2 per 1,000), the other two subregions occupying intermediate positions. In Eastern Europe, the rate of growth was considerably lower in the decade of the 1960s than in the preceding one, but an opposite trend set in in the other three subregions (particularly strong in Northern Europe). In the Soviet Union, there was a significant deceleration in the second decade, but rates of growth have remained much above those registered in the rest of Europe.

12. These figures are inclusive of migration, which assumed quite important proportions in several European countries after the war (see paras. 122-138). In so far as the movement was generally from the south to the north, in the southern subregions these rates were lower than those relating to natural growth, whereas the opposite was true about the northern and western subregions. The rates of natural growth are shown in table 2, together with crude birth and death rates.

13. It will be seen that Europe as a whole experienced a downward trend in the rates of natural increase over the three periods indicated. In the eastern subregion, the decline appears continuous (the 1950-1959 average hides, however, some increase recorded during the first quinquennium). In the other subregions, the rates of natural increase were somewhat higher in the 1960-1964 quinquennium than during the 1950-1959 decade, but there was a marked decline afterwards, particularly sharp in Western Europe. Southern Europe seems to have experienced relatively little fluctuation and more or less maintained its average rates of growth of the 1950s into the late 1960s. In the other three regions, the rates levelled off in the late 1960s at some 6-7 per 1,000.

14. There was a further decline in the rates of natural growth in the early 1970s in many countries of Europe. In several of them, zero or near zero rates were recorded (Austria, Belgium, England and Wales, Finland, Hungary, Sweden). In the German Democratic Republic and the Federal Republic of Germany, there was an excess of deaths over births.

TABLE 2 CRUDE RATES OF NATURAL INCREASE, BIRTH AND DEATH, BY SUBREGION, 1950-1970

(Average annual rates per 1,000 population)

Subregion	Natural increase			Birth rates			Death rates		
	1950-1959	1960-1964	1965-1969	1950-1959	1960-1964	1965-1969	1950-1959	1960-1964	1965-1969
Eastern Europe	11 8	8 1	7 1	22 5	17 5	16 8	10 7	9 4	9.7
Northern Europe	5 6	6 7	6 1	16 7	17.9	17 3	11 1	11.2	11 2
Western Europe	6 4	7 2	5 9	17 6	18 3	17 2	11.2	11.1	11 3
Southern Europe	10 9	11 2	10 1	20 9	20 5	19 3	10 0	9.3	9.2
Total Europe (excluding USSR)	8 8	8 5	7 3	19 5	18 7	17 7	10 7	10 2	10 4
USSR	17 4	15 1	10 0	25 8	22 3	17 6	8 4	7 2	7 6

SOURCES: United Nations, *Demographic Yearbook*, various issues, and national sources

15 The evolution towards a narrowing of regional differences was mainly due to changes in the levels of crude birth rates, in particular to the spectacular drop in fertility experienced by Eastern Europe and by the Soviet Union (see table 2). By the early 1970s, these rates oscillated around 14-15 per 1,000 in most European countries However, they were lower (around 12-13 per 1,000) in the German Democratic Republic, Finland and the Federal Republic of Germany, and markedly higher (around 20 per 1,000) in Ireland, Portugal, Romania and Spain Crude death rates have remained constant or even increased slightly in the two industrially more advanced regions and are now significantly higher than those recorded in Eastern and Southern Europe and, even more so, in the Soviet Union These differences in crude rates are entirely due to the relatively young age structure and the smaller incidence of "population aging" in the less developed areas which have the effect of reducing the over-all mortality indicators A more detailed analysis of post-war trends in fertility and mortality is given below in paragraphs 77-94 and 95-125, respectively.

Changes in the age composition of the population

16. *In the immediate post-war period, the less de*veloped areas of Europe had significantly higher proportions of young people and lower proportions of old people compared with the economically more advanced regions. This was due to the historically negative association between degrees of development and fertility levels and, to a lesser extent, to differences in mortality The summary data in table 3 show again a tendency towards a reduction of the differences in the age structure of the populations that existed in various parts of Europe after the war. Thus, the proportion of persons below 15 has tended to increase in the northern and western parts of Europe and to decline in Eastern and Southern Europe. By 1970, about a quarter of the population belonged to this age bracket everywhere, except in the Soviet Union (where it accounted for nearly 30 per cent) At the other extreme of the age distribution, the table shows marked increases in relative numbers, indicating that the process of the "aging" of populations is well advanced in Europe By the year 1970, about 17 per cent of the population of Europe was aged 60 or more, and this represented a considerable increase on the figures for 1950 The proportion of *grands vieillards* (defined as persons aged 75 or more) rose even more quickly, in most areas by from one third to one half over the 20 years under review

17 In the more advanced regions, the cumulative effect of aging and of slightly increasing proportion of the young has tended to reduce the proportion of people in the 15-59 age bracket, usually referred to as the "working-age population" In Eastern and Southern *Europe, the aging process more than offset the effect of* the decline in the proportion of the young and the share of the working population declined somewhat.

18. The last column of table 3 shows changes in the "dependency burden", defined as a ratio of the young and the old to the working-age population Comparing the data for 1970 with the data for 1950, one can see a considerable deterioration in this important economic indicator everywhere. By 1970, there were about three "dependents" per four "potential workers" in Northern and Western Europe. In other areas, the ratio was more favourable, though on the increase

The urbanization process

19. For Europe as a whole (but excluding the Soviet Union), population defined as "urban" grew on the average at an annual rate of 16 per 1,000 between 1950 and 1970, this being almost exactly twice the rate recorded for the total (i e , urban and rural) population. There were, however, important interregional differences in the rate at which European populations continued to "urbanize". As one would expect, the trend was slower in the areas already highly urban and faster in those where the rural character of the society still prevailed after the last war. There were also some differences between the two post-war decades, as indicated in table 4. Thus, urban population grew somewhat faster during the second than during the first decade in Northern and Southern Europe, but slower in the other two subregions and in the Soviet Union

TABLE 3. SOME CHARACTERISTICS OF THE AGE STRUCTURE OF POPULATIONS, BY SUBREGION, AROUND 1950, 1960 AND 1970

Subregion [a]	Year	Percentage of total population				Number of persons below age 15 and above age 60 per 1,000 persons aged 15-59
		−15 age group	15-59 age group	60+ age group	75+ age group	
Eastern Europe	1950	26.7	62.4	10.9	2.2[b]	603
	1960	28.0	59.0	13.0	2.7[b]	695
	1970	24.6	59.8	15.6	3.4[b]	674
Northern Europe	1950	23.5	61.4	15.1	3.4	629
	1960	23.9	59.4	16.7	4.1	683
	1970	24.1	57.6	18.3	4.4	737
Western Europe	1950	23.1	62.0	14.9	3.3	613
	1960	24.3	59.1	16.6	3.9	691
	1970	24.2	57.5	18.3	4.4	740
Southern Europe	1950	27.4	61.5	11.1	2.2	626
	1960	26.8	60.6	12.6	2.8	651
	1970	26.2	59.3	14.5	3.3	685
Total Europe (excluding USSR)	1950	25.2	61.8	13.0	2.8[b]	617
	1960	25.8	59.6	14.6	3.4[b]	678
	1970	24.8	58.5	16.7	3.9[b]	709
USSR	1950	30.3	61.5	8.2	1.6	626
	1960	30.4	60.0	9.6	2.0	666
	1970	28.9	59.3	11.8	2.4	687

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national sources.

[a] Subregions include the following countries:
Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.
Northern Europe: Denmark, Finland, Ireland, Norway, Sweden, United Kingdom.
Western Europe: Austria, Belgium, France, Federal Republic of Germany, Netherlands, Switzerland.
Southern Europe: Greece, Italy, Portugal, Spain, Yugoslavia.
[b] Excluding Bulgaria, Czechoslovakia and Romania.

20. The rates of growth of the urban populati[illegible] can be compared with those in the total (urban a[illegible] rural) population in columns 4-6 of table 4, and it w[illegible] be noticed that, for Europe as a whole, the former w[illegible] on the average almost tw[illegible] as the lat[illegible] However, the ratio was [illegible] in Eastern [illegible] Southern Europe and o[illegible] northern [illegible] western regions. In a [illegible] in the rates [illegible] growth of the total p[illegible] Europe [illegible]

[illegible]viet Union in the 1960s accelerated the urbaniza- [illegible] in th[illegible] Comp[illegible] [illegible]rtions of urban population points [illegible] d 1950, 1960 and 1970— see [illegible] which had more of th[illegible] in rural areas in 1950, and [illegible] (as well as the Soviet [illegible] ave ste[illegible] threshold and have more of their [illegible]sified as urban in 197[illegible]

[illegible]NIZATION [illegible]ON,

Subregion	[illegible] 1970	[illegible]	Urban as [illegible] total 1950	
Eastern Europe			44	
Northern Europe			69	
Western Europe				
Southern Europe[b]				
Total Europe (excluding USSR)				62
USSR				56

SOURC[illegible] *Demographic* [illegible] issues; [illegible] locality [illegible] than [illegible] or extrap-
[a] As [illegible] of urban [illegible] accepted. [illegible] der to [illegible] regional to[illegible] urban

Over the same period of 20 years, Northern and Western Europe increased their urban populations to around 72 per cent of the total

Trends in nuptiality

22. The demographic concept of nuptiality covers three main events entry into marital life (first marriage), dissolution of the marital union by death or by divorce; and remarriage Numerically, the first event is by far the most important Roughly, some 80-95 per cent of Europeans marry at least once, 10-20 per cent are divorced and 10-15 per cent remarry Because they occur at young ages, first marriages and, to a lesser extent, divorces have a direct impact on fertility The incidence of widowhood and remarriage is less significant for population growth but—together with that of divorce—has important social and, to a somewhat lesser extent, economic consequences

Changes in marital status and in marriage trends

23. Changes in nuptiality can be described in many ways; two are used here. a comparison of the distributions of the female population by marital status at various points of time (usually the census dates to which the information relates); and a comparison of the number of events (marriages, divorces, remarriages) occurring in a year in relation to the appropriate populations. Both measures can be expressed as crude rates or as more specific indexes relating the individuals or events more closely to the populations "at risk". In the following discussion, use is made of both the crude and specific rates.

24 Table 5 shows the distributions by marital status of all women aged 15 or more around 1950, 1960 and 1970. Looking first at the data at the earliest date, one notices a considerable spread in the proportion of single women between countries Thus, around 1950, this proportion varied from less than 20 per cent in Bulgaria to more than 40 per cent in Ireland. On the whole, it was rather low in Eastern Europe and high in Southern Europe (outside Yugoslavia). The incidence of widowhood showed an even greater variation, from less than 10 per cent (of women aged 15 or more) in some Scandinavian countries and the Netherlands to nearly 20 per cent in the German Democratic Republic and Austria (it was probably higher in the Soviet Union, for which data are not available) As one would expect, the proportion of divorced women was negligible in the predominantly Roman Catholic countries, such as Ireland, Spain or Italy. The highest incidence of divorce was registered in Denmark and Austria, where it affected more than 3 per cent of women above the age of 15.

25. Between 1950 and 1960, there was a clear and general tendency for the proportion of single women to decline At the same time, there was a sharp increase in the proportion of the divorced in Eastern Europe, as well as in some Scandinavian countries. This trend generally continued, though at a slower rate, during the following decade. By 1970, the proportion of currently married and divorced was everywhere considerably higher than in 1950, though the differences between individual countries remained.

26. Discounting the possible effects of differences between countries in the age structures of their female populations, the analysis was restricted to the two most sensitive age-groups 20-24 and 45-49 (see table 6). The proportion of currently married is first shown for women aged 20-24. The sharp upward trend observed for most countries can be largely associated with the decline in the age at marriage which occurred during the period under study (evidenced below) and, in the belligerent countries, with an improvement in the sex ratios distorted by war losses among men

27. Since few women marry for the first time above the age of 50, the proportions in the age group 45-49 currently married, together with those widowed and divorced, provide a good indicator of the ultimate proportions "ever married" These proportions, derived from table 6, again endorse the view that there has been a continuous increase in the proportion married and a consequent decline in the single state in virtually all European countries Within the proportions "ever married", however, there have been changes in the proportions currently divorced and widowed Divorce has shown an increase over the period while the trends among the widowed were less clear. On the whole, the incidence of widowhood declined in the less developed countries of Europe, where the gains in longevity were the greatest, but in some countries the trend was also strongly influenced by the diminishing impact of war widows Particularly striking was the increase in the proportion of currently married women in the 45-49 age-bracket in the Soviet Union, from about 55 per cent in 1960 to more than 70 per cent in 1970

28. Further evidence of the increase in marriages, particularly in the 1950-1960 decade, is adduced from data on the incidence of first marriages in relation to the population "at risk" (table 7). They confirm a widespread increase in the marriage rate throughout the period in Northern Europe (except in Sweden), an increase in the first decade (the only decade for which there is information) in Southern Europe and certainly in the first decade in Western Europe, but in the second decade, the rate continued to increase only in the Netherlands and in Switzerland, and showed decreases of varying magnitude elsewhere. Only in Eastern Europe was there no significant increase in the specific marriage rate during the period. Reference to the crude marr[illegible]

[illegible]

war period, being largely a reflection of the marriages "postponed" on account of the war (see figure I). The downward trend recorded in the mid- and late 1950s was particularly marked in Eastern Europe, where it generally continued until the early 1960s. Everywhere, the decline in age at marriage must have exercised a positive influence on the generally high rates of [illegible]

TABLE 5. RELATIVE DISTRIBUTIONS OF WOMEN BY MARITAL STATUS, AROUND 1950, 1960 AND 1970[a]

(Per 100 women aged 15 and more)

Subregion or country	1950				1960				1970			
	Single	Currently married	Widowed	Divorced	Single	Currently married	Widowed	Divorced	Single	Currently married	Widowed	Divorced
Eastern Europe												
Bulgaria	18.8	69.2	11.4	0.6	14.1	73.8	11.0	1.1	13.6	73.7	11.0	1.7
Czechoslovakia	24.7	59.1	14.8	1.4[b]	18.0	64.3	15.2	2.5[b]	18.6	62.7	15.4	3.3[b]
German Democratic Republic	22.0	56.0	19.0	3.0	16.1	59.9	19.5	4.5	17.3	58.4	19.3	5.0
Hungary	22.7	59.1	16.6	1.6	17.3	64.1	15.8	2.8	17.0	63.9	15.5	3.6
Poland	...	55.3	...	...	21.1	62.5	14.9	1.5[b]	24.7	59.7	13.4	2.2[b]
Romania	...	...	...	...	20.0	62.8	15.3	1.9[b]	14.0	68.8	14.3	2.9[b]
Northern Europe												
Denmark	24.5	62.2	9.7	3.6[b]	23.5	62.7	10.4	3.4[b]	21.6	62.5	11.6	4.3[b]
Finland	31.6	52.7	13.8	1.9[b]	28.9	54.9	13.3	2.9[b]	28.4	55.1	12.9	3.6[b]
Ireland	42.8	44.8	12.4	—	38.9	48.1	13.0	—	...	...	...	...
Norway	31.6	56.8	9.9	1.7[b]	26.0	61.8	10.1	2.1[b]	24.2	61.9	11.2	2.7[b]
Sweden	28.5	59.6	9.8	2.1[b]	26.6	60.3	10.1	3.0[b]	25.0	59.7	11.1	4.2[b]
United Kingdom:												
England and Wales	24.8	61.6	12.9	0.7	21.9	63.6	13.6	0.9	20.3	64.2	....15.5....	
Northern Ireland	38.1	50.3	11.4	0.2	34.1	53.7	12.0	0.2	...	...	...	...
Scotland	31.7	55.6	12.2	0.5	27.0	59.2	13.1	0.7	24.3	60.3	....15.4....	
Western Europe												
Austria	25.9	52.5	18.1	3.5[b]	26.5	53.5	17.0	3.0[b]	22.7	55.0	18.3	4.0[b]
Belgium	25.0	61.3	12.5	1.2[b]	19.8	65.0	13.9	1.3[b]	19.4	64.5	14.6	1.5[b]
France	23.3	57.7	17.0	2.0	22.4	59.3	16.3	2.0	22.2	59.5	15.7	2.6
Germany, Federal Republic of	26.8	55.4	15.6	2.2	22.7	57.7	17.0	2.6	19.2	59.8	18.0	3.0
Netherlands	32.4	57.8	8.4	1.4[b]	26.4	63.4	8.9	1.3[b]	24.0	64.4	10.1	1.5[b]
Switzerland	33.0	53.4	11.2	2.4	33.3	56.0	8.6	2.1	26.5	59.5	11.0	3.0
Southern Europe												
Greece	31.4	51.8	16.2	0.6	26.1	58.3	14.6	1.0	20.9	63.7	14.1	1.3
Italy	32.1	55.0	12.7	0.2[b]	29.1	58.0	12.5	0.4[b]	...	...	...	...
Portugal	36.7	51.6	11.3	0.4[b]	31.4	55.9	12.2	0.5[b]	...	...	...	...
Spain	37.7	48.3	14.0	—	31.5	55.3	13.0	0.2[b]	...	...	...	...
Yugoslavia	24.2	58.6	15.9	1.3	20.4	63.8	13.9	1.9	20.0	64.7	12.8	2.5
USSR	...	...	...	...	...	56.1	...	...	...	58.0	...	...

[a] Census data: official estimates for "around 1970" for Austria, Denmark, the Federal Republic of Germany, Greece, Netherlands, and the United Kingdom.
[b] Including separations.

TABLE 6. PROPORTIONS OF CURRENTLY MARRIED WOMEN AGED 20-24 AND 45-49, AND PROPORTIONS OF WIDOWED AND DIVORCED WOMEN AGED 45-49, AROUND 1950, 1960 AND 1970[a]

(Percentages of all women in the given age group)

Subregion or country	Women aged 20-24			Women aged 45-49								
	Currently married			Currently married			Widowed			Divorced		
	1950	1960	1970	1950	1960	1970	1950	1960	1970	1950	1960	1970
Eastern Europe												
Bulgaria	65.3	71.1	72.7	87.7	89.5	89.6	9.3	7.1	5.9	0.8	1.2	2.2
Czechoslovakia	44.4	66.1	62.9	76.7	81.6	82.5	11.5	8.5	7.3	2.3[b]	3.7[b]	5.0[b]
German Democratic Republic	38.3	64.6	63.0	74.2	71.8	75.4	12.8	12.9	6.9	3.9	7.4	7.1
Hungary	51.9	67.1	65.0	76.1	77.4	81.7	12.9	11.6	7.7	2.5	3.7	5.0
Poland	46.2	58.0	52.5	70.3	75.7	81.5		12.8	7.3		2.2[b]	3.6[b]
Romania		64.0	73.0		79.9[c]	83.7[c]		13.0[c]	7.7[c]		2.7[bc]	4.2[bc]
Northern Europe												
Denmark	48.1	52.2	54.0	76.3	79.6	82.7	5.0	4.4	4.2	4.8[b]	6.6[b]	6.3[b]
Finland	40.3	45.0	46.6	67.4	71.8	75.6	11.0	9.3	6.8	2.9[b]	4.7[b]	5.4[b]
Ireland	17.6	21.8		66.2	71.6		7.5	6.3		—	—	—
Norway	33.8	49.3	52.4	71.7	79.9	84.1	6.3	5.3	3.2	2.4[b]	2.6[b]	2.9[b]
Sweden	39.8	41.9	37.6	74.1	80.6	82.0	4.6	3.7	3.6	2.8[b]	4.6[b]	5.3[b]
United Kingdom:												
England and Wales	48.0	57.7	58.0	78.0	82.8	83.8	5.8	5.0	8.2[d]	1.1	1.7	
Northern Ireland	29.1	38.6		69.1	74.8		6.8	6.0		0.3	0.4	
Scotland	39.6	51.6	57.5	72.0	78.3	79.0	7.0	6.3	9.4[d]	0.7	1.2	
Western Europe												
Austria	32.8	40.8	53.6	70.1	68.3	75.2	11.3	14.2	7.5	4.3[b]	5.4[b]	5.9[b]
Belgium	43.3	56.1	59.4	80.5	82.8	84.8	7.5	5.8	5.2	1.6[b]	2.3[b]	2.3[b]
France	48.8	52.3	53.5	77.8	79.4	81.3	8.4	7.0	5.8	3.7	5.0	4.7
Germany, Federal Republic of	31.7	44.4	50.2	74.0	70.2	79.8	10.5	16.1	6.3	2.8	4.3	4.1
Netherlands	30.1	40.2	53.1	78.7	82.2	85.5	5.9	4.3	4.0	2.0[b]	2.5[b]	2.2[b]
Switzerland	25.8	34.2	45.0	71.9	76.2	79.2	5.4	4.7	4.4	3.5	3.9	4.4
Southern Europe												
Greece	29.5	34.2	46.7	73.2	78.7	81.4	21.1	13.7	9.4	0.8	1.4	2.1
Italy	32.0	34.2		75.4	77.3		9.2	8.3		0.4[b]	0.7[b]	
Portugal	34.3	37.6		71.5	78.0		10.3	7.1		1.0[b]	1.0[b]	
Spain	20 *	26.4		71.3	76.3		13.5	8.7		—	0.4[b]	
Yugoslavia	57.0	56.6	61.7	75.1	76.1	79.9	17.5	15.3	9.5	1.6	2.5	4.2
JSSR		50.1	55.9		54.9	71.9						

[a] Census data; official estimates for "around 1970" for Austria, Denmark, the Jeral Republic of Germany, Greece, Netherlands, and the United Kingdom.
[b] Including separations.
[c] Women aged 40-49
[d] Including divorced

TABLE 7. RATIOS OF FIRST MARRIAGES, DIVORCES AND REMARRIAGES TO "EXPOSED-TO-RISK" FEMALE POPULATIONS AGED 15 OR MORE, AROUND 1950, 1960 AND 1970

Subregion or country	First marriages (per 1,000 single women)			Divorces (per 1,000 married women)			Remarriages (per 1,000 divorced and widowed women)		
	1950	1960	1970	1950	1960	1970	1950	1960	1970
Eastern Europe									
Bulgaria	144.0	152.6	134.6	3.2	3.4	3.7	28.0	19.8	20.4
Czechoslovakia	102.0	100.2	103.2	4.0	4.9	6.9	16.3	12.5	14.6
German Democratic Republic	85.3	95.8	86.3	10.9	6.3	6.5	34.0	13.5	12.6
Hungary	112.2	107.7	108.7	5.8	6.6	8.4	22.5	21.4	20.8
Poland		103.1	85.4	2.1	2.3	4.8	. .	9.6	11.0
Romania			138.2		6.9	5.1	. .	...	22.8
Northern Europe									
Denmark	81.3	75.2	85.9	6.8	6.1	7.5	30.4	20.1	16.2
Finland	63.5	62.8	91.0	4.6	4.0	6.0	16.7	11.1	10.2
Ireland	35.4	40.0		—	—	—	2.5	1.6	...
Norway	64.3	62.3	76.5	3.2	2.8	3.7	11.4	11.2	8.6
Sweden	62.8	56.7	47.9	4.9	4.7	6.7	16.9	14.7	9.7
United Kingdom:									
England and Wales	71.6	76.5	92.5	2.6	2.1	5.5	16.9	12.8	18.8
Northern Ireland	45.9	53.1		0.7	0.5		5.8	4.1	...
Scotland	59.5	69.1	80.6	1.7	1.5	3.6	11.0	8.7	12.2
Western Europe									
Austria	65.5	70.6	59.5	6.7	5.0	5.9	17.5	11.2	9.8
Belgium	82.6	79.5		3.1	2.0		18.1	10.2	...
France	69.8	70.4	70.3	3.0	2.8	3.1	9.8	8.9	7.9
Germany, Federal Republic of	76.6	89.8	79.1	6.8	3.4	5.0	27.7	10.8	11.0
Netherlands	78.6	78.3	100.5	4.4	2.2	3.3	31.8	13.8	13.3
Switzerland	53.1	58.0	65.5	4.2	3.9		14.6	13.0	11.8
Southern Europe									
Greece		82.0			1.5			5.0	...
Italy	55.5	68.2		—	—		2.7	1.8	.
Portugal	55.9	62.2		0.6	0.4		5.2	4.0	.
Spain	49.9	63.7		—	—		2.9	2.0	
Yugoslavia	100.5	111.5	109.0	4.4	5.1	4.1	15.3	15.5	13.2
USSR					5.4	11.7		.	..

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national data.

marriages. In the late 1960s and early 1970s, the numbers of current marriages were no doubt inflated by the arrival at marriageable age of the large post-war birth cohorts.

29. What proportion of single women marry every year? For most countries, an answer to this question can be given only at census dates (see the first three columns of table 7). The intercountry variations are much more pronounced than those referring to crude marriage rates. Only about 4 per cent of Irish spinsters marry in a year, but this figure exceeds 10 per cent in most socialist countries of Europe. Over-time trends are very irregular and do not lend themselves to easy generalizations.

Trends in age at marriage

30. As shown in figure II, the decline in the ages at which women marry was general, sharp and affected both sexes. The only exceptions were Bulgaria and Yugoslavia, where age at marriage was already very low at the beginning of the period. It is interesting to note a distinct upward inflexion of the curves in Denmark and Sweden in the mid-1960s, probably associated with the spreading practice among young people to cohabit without a formal contract of marriage.

31. Among women, the average age at marriage declined from about 26-27 years of age to 24-25 in most Scandinavian countries (as well as in England and Wales), and from around 27-28 to 24-25 in several western countries. The drop was smaller in Belgium, France, Italy and Portugal, and in most east European countries, where it rarely exceeded one year on the average. By the late 1960s, the intercountry variation in the age at which women marry was smaller than at the beginning of the period under review. Around 1970, the lowest ages (around 23.0) were recorded in Bulgaria and Romania, and the highest (above 25.0) in Ireland, Sweden and Switzerland.

Divorces and remarriages

32. A feature of post-war demographic developments in Europe has been a significant increase in the

number of divorces. The trend has, however, exhibited fluctuations from country to country.

33. "Crude divorce rates", defined as the number of divorces per 1,000 population, increased sharply in Eastern Europe, in some northern countries (England and Wales, Finland, Norway and Scotland), as well as in Belgium. The rates were highest in the socialist countries, and in Austria, Denmark, and Sweden where they generally exceeded 1 per 1,000 and amounted to about 15 per cent of the crude marriage rates. The actual incidence of divorce in relation to the population "at risk" is shown in table 7. Around 1970, the highest rate was that of the Soviet Union, where more than 1 per cent of currently married women had obtained a divorce Denmark and Hungary also registered a high incidenc of divorce, amounting to about 0 8 per cent of marriag

34. The divorce rates are largely a function of soci legislation, and the trends in Eastern Europe can b attributed in the main to the relaxation of the laws o divorce. In the Soviet Union, the liberalization c divorce laws probably resulted in an increase in th crude divorce rate from 1.3 to 2.7 between the beginnin and the end of the 1960s. An instance of the effect c restrictive legislation is provided by Romania, wher the crude divorce rate in the period 1966-1970 wa about one quarter of that prevailing previously.

35. In the early 1950s, the number of remarriage was generally higher than the number of divorce

Figure I. Crude first-marriage rates

(Per 1,000 population)

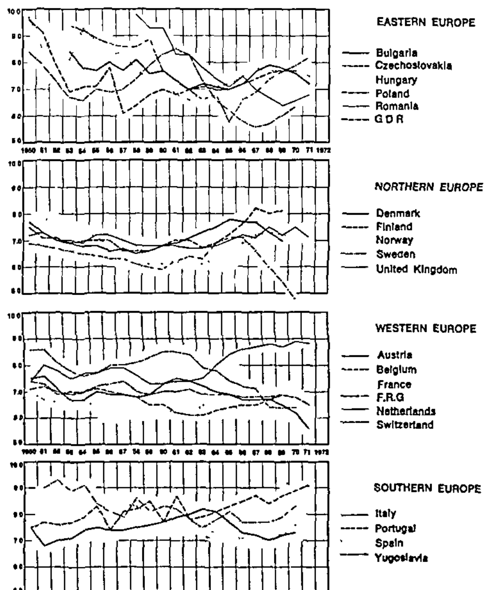
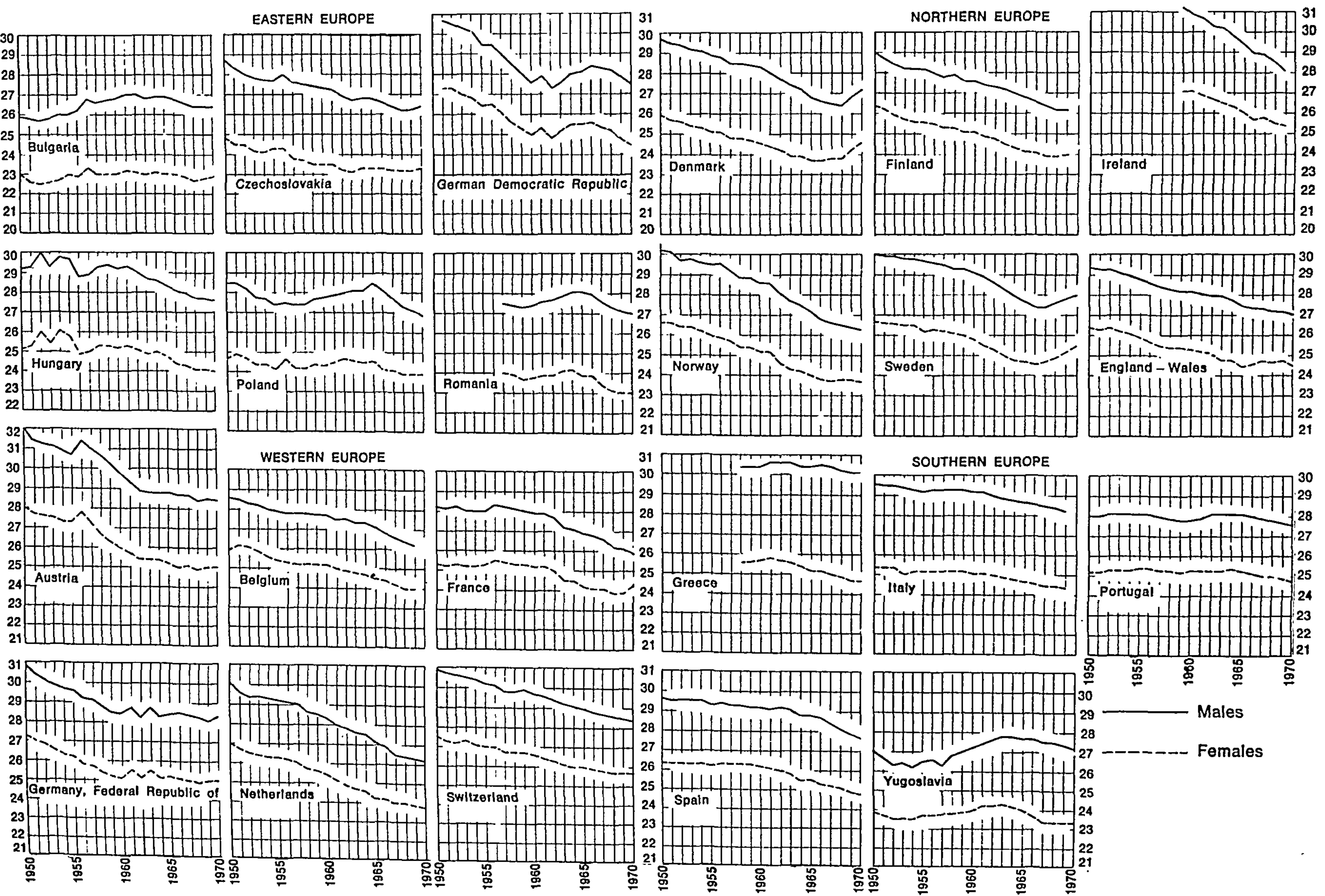


Figure II. Trends in average age at marriage, 1950-1970



However, the crude remarriage rates fluctuated little over the 20-year period, so that by the late 1960s the divorce rates exceeded the remarriage rates in most countries. If female remarriages are related to the exposed-to-risk female population (i.e., the sum of divorcees and widows), the index becomes much more sensitive (see the last three columns of table 7). It would appear that in many countries (Denmark, the German Democratic Republic and Sweden, and in most of Western Europe) the remarriage rates among women fell markedly. The high levels of remarriage in the earlier post-war years were no doubt due in part to the relatively young age of the war widows.

Trends in fertility

36. This section provides first a broad picture of trends in European countries in "period" or "calendar" fertility, as measured by annual changes in crude birth rates. An attempt is made to measure and to isolate the impact of such demographic factors as age, sex and nuptiality on these trends, in order to arrive at trends in marital birth rates freed from these distorting effects The long-term fertility trends underlying current fluctuations are then studied by recourse to data on the distribution of current births by birth order and to estimates of achieved fertility by marriage cohorts at various durations of reproductive life. As mentioned in paragraph 5, use has also been made of data on expected family size, derived from a series of national surveys of fertility and family planning undertaken in various European countries during the past few years This source also provided some information on the incidence of family planning and on the specific methods of birth control currently used in Europe.

Trends in crude birth rates

37 The post-war fluctuations in crude birth rates in Europe (illustrated in figure III for selected countries) do not lend themselves to easy generalization. The almost universal post-war "baby boom" lasted only a few years in most countries of the area. Subsequent developments varied greatly between countries and regions, at least until the mid-1960s.

38. There was relative uniformity among the countries of Eastern Europe (and in Yugoslavia), where the common feature was a decline in crude rates, which set in between 1950 and 1955 in most countries, though somewhat later in the German Democratic Republic and the Soviet Union This decline, which resulted in a 30-40 per cent reduction in crude rates, generally came to a halt in the mid- or late 1960s and was followed in some countries (Bulgaria, Czechoslovakia, Hungary and Poland) by a temporary reversal of the trend, associated partly with pro-natalist measures introduced by the Governments concerned and partly with the entry into the reproductive age of women born during the post-war baby boom In Romania, a sharp rise in the rates followed the modification of very liberal abortion laws in 1966, supported by the introduction of financial measures encouraging larger families

39. Other countries of Europe can be roughly divided into four groups, according to the trends in crude birth rates experienced during the period 1950-1964

(*a*) Relative stability: France, Norway, Portugal, Spain;

(*b*) Virtually continuous decline Finland and the Netherlands (a drop of about 30 per cent);

(*c*) Relative stability or slight decline (around 10 per cent), followed by a slight rise between 1960 and 1964 Denmark, Italy, Sweden, Switzerland,

(*d*) *Relative stability or slight decline followed by* a sharp increase during the 1950s and early 1960s. Austria, the Federal Republic of Germany, and the United Kingdom of Great Britain and Northern Ireland.

40 The mid-1960s (in most countries the year 1964) represented a turning-point. At that time, crude rates began to decline in all the countries listed in groups (*a*), (*c*) and (*d*), and continued to decline in Finland and the Netherlands Between 1965 and 1970, the drop was relatively small (10-15 per cent) in Belgium, France, Italy and Spain, and somewhat larger (20-25 per cent) in Denmark, Sweden and Switzerland. It was particularly steep (30-40 per cent) in the countries that had experienced sharp rises prior to 1964 Austria, the Federal Republic of Germany, and the United Kingdom

41 These downward trends generally continued into the early 1970s, and in 1972—the last year for which data were available at the time of reporting—Europe was a very low fertility area, with crude rates in many countries below 14 per thousand (Austria, Belgium, Federal Republic of Germany, Finland, German Democratic Republic and Sweden) In many countries of Europe, the 1972 levels were the lowest ever recorded and the contrast with the post-war peaks was striking Since the earlier post-war trends in fertility have been described elsewhere,[2] the present section focuses largely on the possible causes of the recent decline.

The demographic determinants of changes in crude birth rates

42. Changes in crude birth rates may be due to changes in the age and sex composition of the population and in the proportions of married women to all women in reproductive ages, as well as to variations in marital fertility.

43 A useful first step in the analysis of fertility consists therefore in disaggregating actual trends in crude birth rates into three components:

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[2] See, for instance, *Recent trends in fertility in industrialized countries* (United Nations publication, Sales No. 57.XIII.2); D V. Glass, "Fertility trends in Europe since the second world war", *Population Studies*, vol 22 (March 1968); P. Festy, "Evolution de la fécondité en Europe occidentale depuis la guerre", *Population*, XXV, (mars-avril) 1970; J Berent, "Causes of fertility decline in eastern Europe and the Soviet Union", *Population Studies*, vol 24 (March and July 1970); L. Tabah, "Rapport sur les relations entre la fécondité et la condition sociale et économique de la [illegible]rope", CDE (71), T. III, Council of Europe.

Figure III. The impact of sex and age structure, nuptiality and marital fertility on crude birth rates

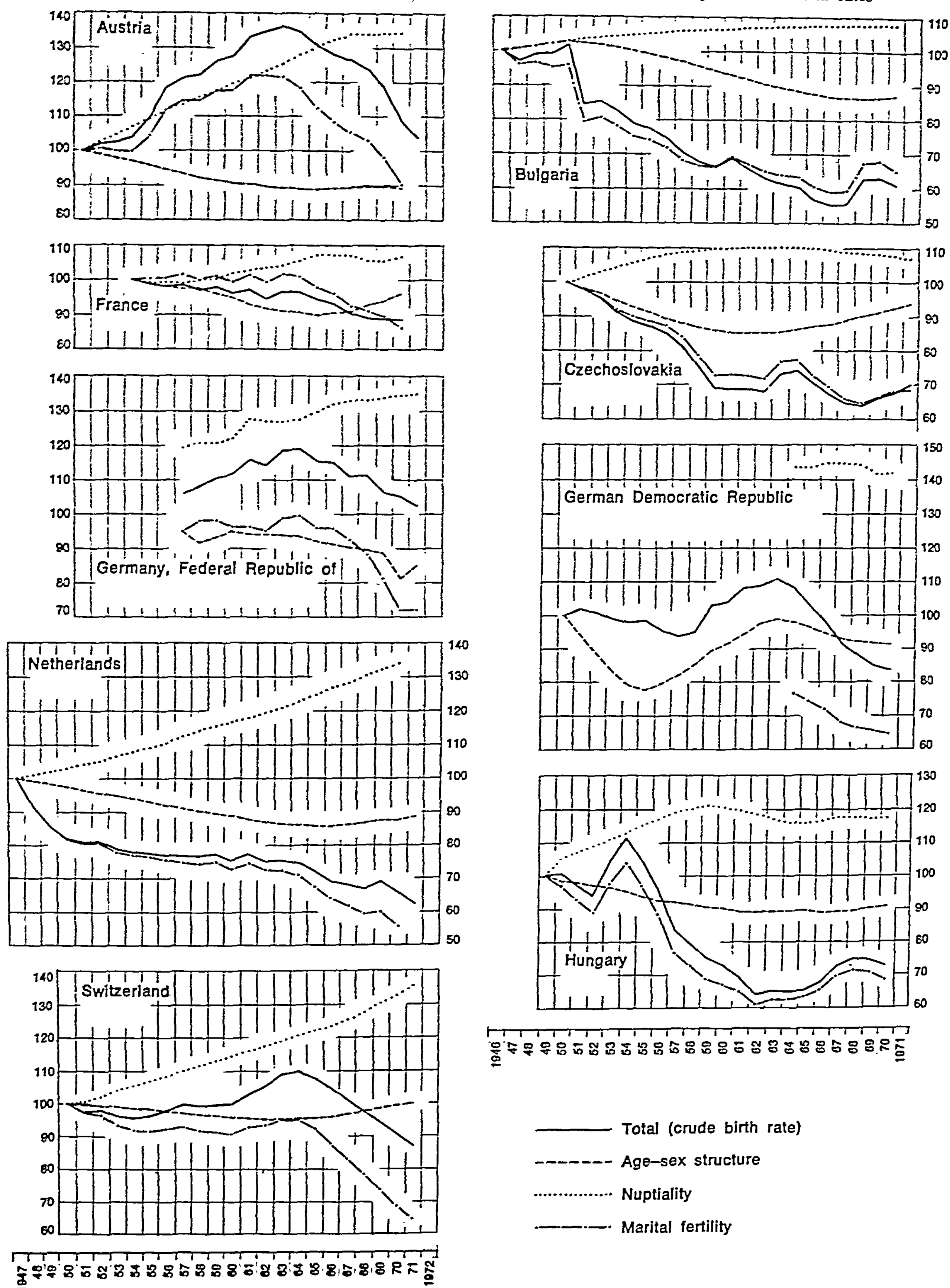
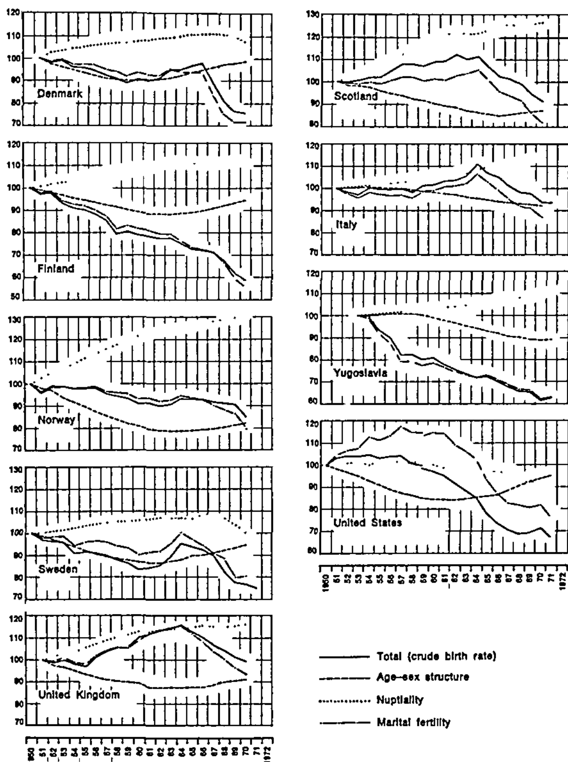


Figure III (*continued*)



(*a*) The proportion of women in reproductive ages to total population and to female population at various ages (the "sex-age structural effect");

(*b*) The proportion of married women to all women in reproductive ages (the "nuptiality effect");

(*c*) The fertility of married women (the "marital fertility effect").

44. The exercise has been carried out for 16 countries and the results are shown in figure III and in table 8. [3] The figure shows trends in crude birth rates and those in the three components as an index, with the year 1950 as a base. In the table, percentage changes in birth rates and in the components are shown for selected periods which are specifically relevant to the country concerned. Since the necessary data are generally available for census dates only, changes over intermediate periods have been estimated and should be regarded as approximations only.

45. Changes in the sex composition of the population (not shown separately in table 8) exercised a negligible effect on trends in crude birth rates during the period studied, except in countries where the war losses in the male population were made up subsequently (i.e., the Federal Republic of Germany, the German Democratic Republic, Poland, the Soviet Union), and it can be assumed that the "sex-age effect" refers overwhelmingly to changes in age composition.

46. It appears that changes in the age structure of the female population exercised, on the whole, a potent negative impact on trends in crude birth rates, at least until about the mid-1960s. In Eastern Europe, roughly from one quarter to one third of the decline in crude birth rates was due to this factor. In the German Democratic Republic, crude birth rates would have increased over the period 1950-1957 but for the impact of the age-sex factor. In several northern and western countries, its impact was also very strong. In the extreme case of Norway (similar to that of the German Democratic Republic), crude birth rates would have increased over the whole 1950-1970 period (rather than decline by 15 per cent) but for the negative effects of changes in age structure. Most of the early decline in Denmark, the Netherlands and Sweden also appears to have the same cause.

47. In general, the situation tended to change in the early to mid-1960s, when women born during the post-war "baby boom" reached reproductive age. After that time, the impact of the age-sex effect, albeit rather small, became positive in a majority of countries for which data are available. In eastern countries, where post-war peaks of birth rates were attained somewhat later than in Western Europe, the full impact of this factor did not begin to be felt until the early 1970s. On the whole, it can be said that the decline in crude birth rates observed after 1964 would in fact have been somewhat more pronounced but for the moderating effect of changes in the age structure of the female population.

48. In contrast to the age-structure effect, nuptiality has had a positive influence on trends in crude birth rates almost everywhere and throughout the period under study. However, its impact varied greatly between countries and periods. In Eastern Europe, its effect was particularly felt during the 1950-1964 period in the German Democratic Republic, where it would have raised the birth rate by more than 40 per cent but for the mitigating effect of other factors. The increase in the proportion of married women also tended to push up the birth rate in Czechoslovakia and in Hungary in the 1950s. [4] Its effect petered out completely, however, in the late 1960s. Over the 1950-1970 period as a whole, the birth rate in the Netherlands and in Norway would have gone up by 30 per cent on account of the nuptiality factor alone rather than decline by 20 and 15 per cent, respectively. The observed increase in birth rates in Austria and the Federal Republic of Germany between 1950 and 1964 would have been much smaller in the former country and negative in the latter but for the increase in nuptiality, and nearly half of the 1955-1964 net increase in the United Kingdom was due to this factor. In other countries, its effect was smaller but generally quite significant in relation to the changes in the birth rates until about mid-1960s. After that, the significance of nuptiality was reduced almost everywhere. Nevertheless, the post-1964 decline in crude birth rates would have been somewhat greater in Austria, the Federal Republic of Germany, Italy, Switzerland and Yugoslavia, but for the increase in female nuptiality.

49. Thus, the general picture of the relative age-sex and nuptiality effects on the crude birth rate is that they tended to offset one another during most of the period under study. There were, however, several exceptions over specific periods in different countries where, as a result, trends in marital fertility departed from those in crude birth rates. Thus, the decline in marital fertility in Bulgaria (1951-1967), in the German Democratic Republic (1964-1970) and in Sweden (1950-1960) was somewhat less than that indicated by the crude birth rates. The opposite was true of Norway (1950-1970), of England and Wales (1964-1970), of Austria (1963-1970), of France (1964-1970), and, especially, of the Netherlands (1950-1970) and Switzerland (1964-1971). In the last two countries, standardized marital fertility declined by as much as 32 per cent, compared with an approximate declinc of 20 per cent in the crude birth rate.

[3] Broadly, the method consisted in calculating hypothetical trends in crude birth rates on the assumption that only one of the three components in paragraph 43 varies in turn, the other two components remaining constant at the 1950 level. For a detailed description, see J. Berent and P. Festy, "Measuring the impact of some demographic factors on post-war trends in crude birth rates in Europe", *Proceedings of the 1973 General Conference of the International Union for the Scientific Study of Population* (Liège, 1973).

[4] This was also true about Poland, for which the relevant data had reached the secretariat too late to be included in the figure and in the table.

TABLE 8 THE IMPACT OF CHANGES IN SEX-AGE STRUCTURE, NUPTIALITY AND MARITAL FERTILITY ON TRENDS IN CRUDE BIRTH RATES IN SELECTED COUNTRIES, 1950-1970

(Percentage change over indicated periods)

Subregion or country	Period covered	Crude birth rate	Change in crude birth rates due to changes in [a] Sex-age	Nuptiality	Marital fertility
Eastern Europe					
Bulgaria	1950-1951	−17	—	1	−17
	1951-1967	−34	−16	4	−25
	1967-1970	10	1	—	9
Czechoslovakia	1950-1959	−31	−14	10	−27
	1959-1964	7	—	1	6
	1964-1968	−14	5	− 1	−17
	1968-1971	10	4	− 1	7
German Democratic Republic	1950-1957	− 6	−18 }	44	−23
	1957-1964	15	20 }		
	1964-1970	−23	− 7	− 1	−16
Hungary	1949-1954	12	− 5	13	4
	1954-1962	−43	− 7	5	−42
	1962-1970	14	2	− 1	13
Northern Europe					
Denmark	1951-1959	−11	−10	7	− 8
	1959-1966	10	5	4	2
	1966-1970	−23	4	− 3	−24
Finland	1950-1970	−42	− 6	12	−45
Norway	1950-1970	−15	−18	30	−21
Sweden	1950-1960	−17	−13	6	−10
	1960-1964	15	1	1	11
	1964-1970	−20	8	− 6	−20
England and Wales	1951-1955	− 3	− 7	6	− 2
	1955-1964	20	− 6	8	18
	1964-1970	−14	4	2	−19
Western Europe					
Austria	1951-1963	36	−11	26	22
	1963-1970	−20	—	5	−26
France	1954-1964	− 3	− 9	6	1
	1964-1970	− 8	6	1	−15
Germany, Federal Republic of	1950-1964	19	− 7	27	—
	1964-1971	−31	− 9	6	−28
Netherlands	1950-1970	−20	−11	30	−32
Switzerland	1950-1960	—	− 4	15	− 9
	1960-1964	10	− 1	5	5
	1964-1971	−20	5	12	−32
Southern Europe					
Italy	1951-1958	− 1	—	3	− 4
	1958-1964	13	− 4	5	11
	1964-1970	−16	− 4	7	−18
Yugoslavia	1953-1957	−18	1	2	−20
	1957-1971	−24	−11	9	−21

SOURCES United Nations, *Demographic Yearbook*, various issues; and national data

[a] Changes in crude birth rates on the assumption that only the indicated factor varies

50 Thus, on the whole, the distortions due to the impact of changes in age structure and nuptiality do not appear to invalidate the broad picture of changes in fertility as shown by the trends in crude birth rates described at the beginning of this section. In particular, the component analysis confirms, indeed eve ^ gth-

ers, the conclusion concerning the post-1964 decline of fertility in the north, west and south of Europe as a real decline in marital fertility.

Trends in current births by birth order

51. To what extent do the observed postwar trends in marital fertility reflect changes in the ultimate size of families, and to what extent do they reflect [illegible] in the ages at which women marry or in the timing or spacing of births? The remaining paragraphs of this section attempt to explore these issues. It needs to be stressed [illegible] that there are [illegible] which would [illegible] completely satisfactory [illegible] [illegible]. The study of the levels and patterns of fertility of marriages [illegible] [illegible].

52. There are, however, [illegible] at least [illegible] of family size for the [illegible] marriage cohorts. [illegible] an analysis of current births according to birth order, a comparison of [illegible] between [illegible] marriage cohorts, and the use of information on expected family size obtained from special sample surveys on fertility. In the first two approaches, the differences over time for recent cohorts reflect aspects of timing as well as family size; in the third approach the validity of "expected family size" as a surrogate for "ultimate family size" for recent cohorts needs to be treated cautiously.

53. Data on current (legitimate) births broken down according to the number of previous births that had occurred to the mother (and by her age) have been available generally for most European countries for some time. These data may be looked upon as distributions of live births occurring to married women in a given year according to the order (first, second etc.) of the birth. A lower average birth order suggests a reduction in the proportion of births of a higher order occurring to married women in a year.[5]

54. Table 5 shows average birth order for births occurring in 1950, 1960 and 1970, and the proportions of these births which are of the fourth or higher order.

[5] [illegible] the probability of having an [illegible] the current family size [illegible] [illegible] [illegible] [illegible] Economic Commission for Europe [illegible] demographic trends.

TABLE 5. AVERAGE BIRTH ORDER AND PERCENTAGE OF BIRTHS OF THE FOURTH OR HIGHER ORDER, AND MEAN AGE OF MOTHER [illegible]

[illegible] or country	Average birth order				Percentage of births of 4th or higher order				Mean age of mother (years)a		
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Eastern Europe											
Bulgaria	2.17	2.04	1.97	1.85	18.2	11.3	10.0	6.3	26.4	25.5	24.8
Czechoslovakia	2.46	2.28	2.17	1.93	17.3	15.4	13.1	8.6	27.1	26.2	25.2
German Democratic Republic	2.14	2.24	2.31	2.04	15.6	16.1	17.3	11.7		25.8	26.1
Hungary	2.44	2.18	2.06	1.88	19.0	14.0	11.2	8.1	27.1	25.9	25.4
Poland	2.55	2.51	2.46	2.22	23.6	21.8	20.2	15.5	27.9	27.5	26.9
Romania		2.25	2.21	2.46		16.5	14.8	19.4		26.3	26.5
Northern Europe											
Denmark	2.31	2.36	2.23	2.13	23.3	17.6	15.1	11.9	28.4	27.2	26.3
Finland	2.77	2.62	2.35	1.98	25.4	23.1	17.9	10.7	29.5	28.3	27.0
Norway	2.30	2.28	2.28	2.08	16.8	15.3	16.0	11.5	29.8	28.5	26.7
United Kingdom											
England and Wales	2.24	2.27	2.27	2.11	14.3	15.6	15.6	11.8	28.5	27.8	26.7
Scotland	2.49	2.45	2.44	2.24	18.6	19.4	19.5	15.2	28.8	27.8	26.9
Western Europe											
Austria	2.31	2.41	2.46	2.30	16.0	15.8	19.8	16.4	25.9	28.2	27.0
Belgium	2.31	2.53	2.46	2.21	17.4	21.7	20.1	15.7	28.6	28.3	27.4
France	2.58	2.68	2.57	2.24	20.8	24.5	22.4	15.5	27.9	27.9	27.2
Germany, Federal Republic of	2.05	2.13	2.15	2.07	12.5	13.5	13.4	11.5	27.8	28.3	27.5
Netherlands	3.07	2.77	2.46	2.18	31.2	25.1	19.7	14.0	30.7	29.7	27.7
Switzerland	2.45	2.33	2.17	2.02	19.7	16.8	13.6	9.7	29.7	28.8	27.8
Southern Europe											
Italy	2.77	2.46	2.36	2.29	25.7	19.8	17.4	15.6	29.5	29.0	28.4
Portugal	3.29	3.07	3.11	2.93	36.3	31.6	32.1	28.6	29.7	29.2	29.1
Yugoslavia	2.88	2.72	2.60	2.44	27.5	25.5	23.0	19.7	27.5	27.4	27.0
USSR	2.58	2.43	2.64	2.48	22.7	20.4	24.2	21.0		28.1	27.7

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national data.
a Calculated from distributions of current live births by age of mother (in five-year intervals).

The decline in average birth order lends support to the notion that fertility has been declining in most east European countries. In Bulgaria, Czechoslovakia, Hungary and Poland, there was a drop in average birth order of about one half of a child between 1950 and 1970. At the latter date, the average was less than 2 0 in the first three countries—probably the world's lowest, and this in spite of some increase in current births observed in the late 1960s. In these three countries, the percentage of births of the fourth or higher order declined from about 20 in 1950 to from 6 to 8 in 1970 For the special reasons referred to in paragraph 38, there was some increase in the average for Romania between 1960 and 1970. In the Soviet Union, the decline was imperceptible because of the maintenance of high fertility levels (and of large family sizes) in the Soviet Asiatic Republics and the growing weight of these overwhelmingly Moslem births in the total

55 Among the northern and western countries, average birth order was already very low in 1950 in England and Wales and in the Federal Republic of Germany (around 2.1-2.2) and was at the same low level in 1970 despite a rise in the intervening period A noteworthy decline of nearly one in average birth order occurred in Finland and the Netherlands over the 20 years. In most countries of this area, average birth order followed the trends in crude births rates described earlier.

56. A steady decline occurred also in the three southern countries. In Italy, a country of traditionally high fertility, the average birth order was 2 8 in 1950 and 2.3 in 1970. The proportion of high birth orders declined from 26 to 16 per cent over the period

Trends in cohort fertility

57. The usual source of data for birth or marriage cohort fertility is the population census, in so far as it contains information on the number of ever-born children. Unfortunately, few European countries have asked this question systematically throughout the post-war period, in spite of international recommendations. Moreover, not all the relevant tabulations from the 1970 round of censuses were available to the secretariat at the time of the preparation of this report. To fill in the gap, estimates of the achieved fertility at various durations of marriage were made by the secretariat by reconstituting, on the basis of current statistics, the reproductive history of marriages contracted after the war. [6]

58. These cumulative fertility rates are shown in table 10 for marriage cohorts of 3, 6 and 10 years' duration, concluded at 5-year intervals since 1948. Fertility of marriages of longer duration is not shown, since it is of historical rather than of current interest.

59. Trends in fertility attained during the first 10 years of marriage are, of necessity, restricted to marriages concluded before 1959. However, as at the current time, roughly three quarters of all births occur during the first 10 years of marriage in the developed European countries, the data suggest trends in ultimate family size for these cohorts. Comparing the average family size achieved during this segment of married life among marriages concluded in 1948, 1953 and 1958, it will be noticed that it declined quite steeply in Hungary (from 1.7 in the 1948 cohort to 1 4 in the 1958 cohort) and in Poland, but less so in Czechoslovakia, where there was a marginal increase between the 1953 and 1958 cohorts With the exception of Yugoslavia, which shared the experience of other socialist countries, achieved fertility has remained at about the same level or even increased slightly in the other countries listed in the table Austria, England and Wales, the Federal Republic of Germany and Norway showed significant increases, which were reflected, as shown earlier, in steep increases in current birth rates before 1964.

60 Comparisons of fertility achieved over a period of six years bring in another cohort—the marriages concluded in 1963. Their attained fertility appears in many countries to have been lower than that of the 1958 cohort The downward trend is, however, more clearly seen by a comparison of marriages of three-year duration, particularly for Denmark, England and Wales, the Federal Republic of Germany and Sweden. However, this downward trend in the more recent cohorts could reflect the effects of a delay in births as well as a reduction in the number. More likely, it reflects changes in both these aspects of fertility.

61. However, the available evidence on the ages at which women become mothers (see table 9), on birth intervals (not shown) and on achieved fertility in six years as a proportion of expected family size (see table 11) indicate that a delay in births is a less likely explanation of the decline in fertility between 1950 and 1970 All these measures suggest an increasing concentration of births at younger ages and in the earlier years of marriage, between 1950 and 1970. The mean age of mothers at the birth of their children shows a systematic tendency downward between 1950 and 1970, the difference being of the order of about two years in most countries (Southern Europe, the German Democratic Republic and Romania constituting notable [illegible]

[illegible]

[illegible]

elimination of higher order births normally occurring at older ages, but the net result is likely to be, at least in part, a greater concentration of births in the early years of marriage. Similarly, data from the Comparative Fertility Study indicate a tendency towards the

[6] In theory, the method consists of relating the total number of births occurring during a specific period, say, 10 years, to marriages concluded 10 years earlier and surviving to the current year, due account being taken of migration In practice, a simplified procedure was adopted for most countries (exceptions being France and the Federal Republic of Germany), ignoring the survival and migration factors This introduced an obvious downward bias in the data shown in table 10 However, intercohort comparisons within one country were probably not unduly distorted

TABLE 10. CUMULATIVE MARITAL FERTILITY RATES OF SPECIFIED MARRIAGE COHORTS BY MARRIAGE DURATION

(Births per 1,000 women married before the age of 50) [a]

	First three years of marriage					*First six years of marriage*				*First 10 years of marriage*		
	Marriage cohorts					*Marriage cohorts*				*Marriage cohorts*		
Subregion or country	*1948*	*1953*	*1958*	*1963*	*1968*	*1948*	*1953*	*1958*	*1963*	*1948*	*1953*	*1958*
Eastern Europe												
Czechoslovakia	995	983	1,015	1,015	973	1,510	1,504	1,515	1,438	1,879	1,807	1,855
Hungary	965	948	851	824	893	1,430	1,266	1,167	1,174	1,677	1,466	1,408
Poland		1,325	1,288	1,129	1,121	..	1,909	1,786	1,555	...	2,264	2,122
Northern Europe												
Denmark	830	868	897	944	789	1,292	1,367	1,423	1,456	1,628	1,708	1,775
Finland	1,043	1,085	1,063	1,066	..	1,574	1,626	1,589	1,524	1,996	2,031	1,944
Norway	1,000	1,064	1,178	1,260	1,171	1,480	1,580	1,753	1,812	1,853	1,970	2,168
Sweden	818	798	794	881	790	1,239	1,246	1,271	1,386	1,547	1,558	1,615
United Kingdom:												
England and Wales	773	712	808	882	794	1,244	1,259	1,451	1,503	1,607	1,707	1,912
Scotland	893	871	906	922	837	1,403	1,471	1,551	1,521	1,808	1,937	1,991
Western Europe												
Austria		873	1,017	1,090		.	1,278	1,457	1,516	...	1,597	1,755
Belgium	950	965	1,027	1,082		1,395	1,467	1,568	1,579	1,771	1,886	1,953
France	962	967	1,004	1,032		1,507	1,567	1,621	1,619	1,936	2,033	2,073
Germany, Federal Republic of	897	908	977	995	873	1,262	1,348	1,479	1,445	1,559	1,690	1,827
Netherlands	1,104	1,074	1,115	1,127	.	1,735	1,722	1,790	1,740	2,256	2,232	2,221
Switzerland [b]	1,084	1,106	1,159	1,221	.	1,614	1,658	1,721	1,727	1,976	2,016	2,044
Southern Europe												
Italy	1,068	1,060	1,102	1,126	..	1,546	1,557	1,635	1,633	1,952	1,978	2,046
Yugoslavia		1,033	987	977	..	.	1,598	1,518	1,454	..	2,004	1,890

[a] For the Federal Republic of Germany, all women irrespective of age at marriage.
[b] Swiss marriages only.

shortening of the interval between marriage and the first birth and between the first and second births in virtually all countries covered by the study. Lastly, the proportion of expected ultimate family size, born during the first six years of marriage, has increased in almost all countries and markedly so for Belgium, France and Finland. [7] Approximate though this information is, it again points in the direction of a greater concentration of births.

62. Thus all changes in the measures reflecting the timing of births would have the effect of increasing the period fertility rate. The fact that the period fertility rates have been declining since 1964 suggests a real fall in family size among recent marriage cohorts in almost all countries.

63. Certainly women married recently in many European countries expect to have smaller families than those married earlier. Questions on the number of children they expected to have were asked of probability samples of married women in about a dozen European countries during the period 1966 to 1972. The answers have been cross-tabulated by many variables for the purpose of the forthcoming Comparative Fertility Study. Some selected tables have been reproduced here to complete the present analysis.

64. The basic concept used is that of the "total number of births expected", which is the sum of the number of births that had actually occurred to the couple by the time of the survey and of the number of children the wife expected (or intended) to have in the future (as stated by her in the questionnaire). Thus, as a concept, the "total number of births expected" is equivalent to the conventional notion of the "ultimate family size". [8]

65. Table 12 shows trends in the average total number of births expected for several marriage cohorts for the whole population, and by the urban/rural residence of the couples at the time of the survey. The data

[7] *The data for England and Wales indicate an even greater concentration, but the data on "expected number of children" are probably an underestimate of the ultimate family size for the more recent cohorts because a "minimum" estimate was used.*

[8] The sample data on the expected family size need to be treated with circumspection. Many women do not know precisely how many births they expect and for some of them their intentions or desires are not synonymous with expectations. Moreover, for older marriages, the expected family size contains a high share of births that have already occurred, so that the data for recent marriages are subject to a wider margin of uncertainty. Also, because of an upper age-limit operating in all the surveys, the earlier marriage cohorts over-represent women who married at younger ages.

TABLE [illegible] [illegible]

[illegible]

Country	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Belgium	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Czechoslovakia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Denmark	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
England and Wales	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Finland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
France	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hungary	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Poland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Yugoslavia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Source: [illegible]

indicate a marked decline [illegible] between the earlier and the [illegible] downward trend [illegible] greatly among the [illegible] [illegible] Denmark [illegible] Belgium [illegible] and [illegible] England and Wales [illegible] of the decline. [illegible] Czechoslovakia and Poland [illegible] Finland [illegible]

[illegible] Denmark and France.

[illegible]

[illegible]

TABLE 12. AVERAGE TOTAL NUMBER OF BIRTHS EXPECTED, BY MARRIAGE COHORT AND CURRENT RESIDENCE

(*Average per woman*)

Marriage cohort	*Belgium (1966)*	*Czechoslovakia (1970)*	*Denmark (1970)*	*England and Wales[a] (1967)*	*Finland (1971)*	*France (1971)*	*Hungary (1966)*	*Poland (1972)*	*Yugoslavia (1971)*
				A. *Whole country*					
All women	2.39	2.37	2.55	2.21	2.55	2.56	2.19	2.80	2.71
Before 1951	2.72	2.77	2.71	2.55	4.00	2.88	2.47	3.45	3.39
1951-1955	2.41	2.40	2.65	2.42	3.05	2.94	2.21	3.05	3.05
1956-1960	2.34	2.30	2.61	2.24	2.77	2.64	2.05	2.75	2.70
1961-1965	2.17	2.29	2.45	1.92	2.34	2.55	1.87	2.47	2.47
1966 or later		2.19	2.44	1.71	2.02	2.15		2.24	2.13
				B. *Rural residence*					
All women	2.73	2.59	2.76		2.83	2.71	2.38	3.34	2.97
Before 1951	3.30	3.30	3.08	..	4.14	3.12	2.62	4.05	3.59
1951-1955	2.65	2.57	2.87		3.51	3.02	2.42	3.70	3.34
1956-1960	2.68	2.79	2.93		3.10	2.62	2.24	3.30	2.95
1961-1965	2.50	2.41	2.58		2.52	2.87	2.03	2.96	2.69
1966 or later		2.33	2.42	..	2.02	2.18		2.53	2.25
				C. *Urban residence*					
All women	2.35	2.25	2.45		2.32	2.49	1.93	2.38	2.20
Before 1951	2.55	2.49	2.57	..	3.75	2.77	2.21	2.90	2.64
1951-1955	2.37	2.29	2.54	..	2.61	2.90	1.93	2.54	2.44
1956-1960	2.29	2.35	2.49	..	2.47	2.65	1.79	2.35	2.11
1961-1965	2.13	2.24	2.37		2.21	2.41	1.72	2.14	2.12
1966 or later		2.12	2.44		2.02	2.14		2.01	1.93

SOURCE: The Comparative Fertility Study.

[a] Data refer to the "minimum" estimate.

What can be said is that they generally have at their disposal more efficient means of controlling their family size compared with the earlier marriages.

67. Thus, the general picture is once again one of a likely decline in fertility in many countries to levels much below those needed to maintain their current population size.

Some socio-economic differentials in total expected family size

68. The narrowing of the urban/rural differential in the average total expected family size has already been noted in paragraph 65. Its persistence in some countries where the rural sector is still important (such as Poland and Yugoslavia) means that further urbanization will continue to depress the over-all fertility levels.

69. Two other socio-economic characteristics of wives, which appear to be of particular importance to fertility differentials, have been introduced in table 14, namely, their educational attainment and employment status.

70. With the exception of Denmark, there appears to be a clear negative correlation between fertility and the level of education attained by the wife, at least up

TABLE 13. PERCENTAGE OF WOMEN EXPECTING: (*a*) ONE OR TWO CHILDREN; AND (*b*) FOUR OR MORE CHILDREN, BY MARRIAGE DURATION

	One or two children					*Four or more children*				
		Marriage duration					*Marriage duration*			
Country	*All*	*15+*	*10-14*	*5-9*	*0-4*	*All*	*15+*	*10-14*	*5-9*	*0-4*
Belgium	55	51	52	57	65	20	27	22	16	9
Czechoslovakia	67	58	61	70	77	9	16	11	6	3
Denmark	51	45	48	55	55	15	24	15	11	11
England and Wales[a]	60	51	54	62	79	14	22	16	8	3
Finland	55	38	51	64	73	18	39	22	8	2
France	54	41	51	57	69	18	30	18	16	4
Hungary	69	57	67	77	85	11	17	11	6	2
Poland	49	35	51	63	69	22	34	19	10	3
Yugoslavia	58	44	54	64	77	21	33	23	13	7

SOURCE: The Comparative Fertility Study.

[a] Data refer to the "minimum" estimate.

TABLE 14 AVERAGE TOTAL NUMBER OF BIRTHS EXPECTED BY WIFE'S EDUCATION AND EMPLOYMENT STATUS

(Average per woman)

	Belgium	Czechoslovakia	Denmark	England and Wales[a]	Finland	France	Hungary	Poland	Yugoslavia
Education of wife									
Less than elementary	3.49		2.58		3.10	4.30[b]	2.85	3.87	3.76
Elementary	2.45	2.64		2.27	2.67	2.75	2.29	3.81	2.53
Lower secondary	2.30		2.36		2.16	2.34	1.94	2.94	2.25
High secondary	2.21	2.13	2.46	2.11		2.34	1.74	2.25	1.96
Post secondary	2.80	2.13	2.74	2.05	2.30	2.37	1.89	1.98	1.86
Employment status of wife									
Whole country									
Working	1.93	2.26	2.46	1.96	2.46	2.10	2.00	2.76	2.38
Not working	2.69	2.92	2.65	2.42	2.68	2.82	2.41	2.91	2.66
Urban									
Working	1.87	2.16	2.38		2.22	2.06	1.81	2.30	2.23
Not working	2.65	2.85	2.56		2.45	2.78	2.22	2.60	2.43
Rural									
Working	2.39	2.49	2.66		2.79	2.27	2.22	3.34	2.48
Not working	2.93	3.05	2.87		2.89	2.89	2.47	3.34	3.18

SOURCE The Comparative Fertility Study
[a] Data refer to the "minimum" estimate
[b] Fewer than 50 women

to and including "high secondary" level In some countries (Belgium, Finland), there is a slight but distinct upward trend of the curve for women with post-secondary education. Otherwise, the differences are very pronounced between the elementary and secondary levels, particularly in such less economically advanced countries as Yugoslavia and Poland On the whole, the improvement in educational levels will no doubt tend to reduce the over-all fertility levels for some time to come in most of Europe.[11]

71. The rapid increase in the economic activity of women outside agriculture has often been cited as the principal cause of fertility decline in Eastern Europe and the Soviet Union after the war. There has been some increase in the incidence of female urban employment also in other parts of Europe, and it is very likely that it has contributed to the downward fertility trend of the 1960s and early 1970s The data of table 14 confirm the existence of a fertility differential between women according to their current employment status, women working at the time of the survey expecting on average around one half of a child less than those not working (The differential was wider in Belgium, Czechoslovakia and France, but narrower in Denmark, Finland and Poland) On the whole, the differential between working and not working women tends to be more important in urban than in rural areas, since children are less of an impediment to women working in agriculture than to those pursuing an employment in towns.

Incidence and methods of family planning

72. Judging by the low levels of achieved fertility, European couples appear to be quite efficient in controlling the size of their families, particularly among the younger cohorts.

73. The data—derived once again from the Comparative Fertility Study—confirm a high proportion of current users of birth control in various European countries. The proportion of women using some method among all women exposed to the risk of pregnancy (mostly those who were not sterile or pregnant at the time of the interview) was around, or exceeded, three quarters in most countries, but was distinctly lower in Hungary and Yugoslavia, where it amounted to about two thirds (see table 15).

74 As to the main methods currently used,[12] one notices frequent resort to coitus interruptus in the three socialist countries (Czechoslovakia, Hungary and Yugoslavia) and to a lesser extent in Belgium and France In the last two countries, withdrawal and safe period were jointly responsible for as much as 78 and 61 per cent, respectively, of all methods used—very high proportions for countries of this level of [illegible] de-

[11] The correlation between expected family size and wife's education is partly spurious, inasmuch as there is an interrelation between education and marriage duration (the proportion of less educated women being higher among older marriages) More extensive cross-tabulations, introducing several other variables in addition to education, will be analysed in the Comparative Fertility Study

[12] See foot note [b] of table 15.

TABLE 15. INCIDENCE AND METHODS OF CURRENTLY PRACTISED BIRTH CONTROL IN SELECTED COUNTRIES

(Percentage)

	Belgium (1966)	*Czechoslovakia (1970)*	*Denmark (1970)*	*England and Wales (1967)*	*Finland (1971)*	*France (1971)*	*Hungary (1966)*	*Netherlands* [a] *(1969)*	*Yugoslavia (1970)*
Number of women (respondents) . .	2,972	2,548	2,138	6,097	785	2,424	7,214	2,000	5,215
Current users:									
As percentage of all respondents	76	66	68	71	86	66	64	59	59
As percentage of women exposed to risk of pregnancy	83	79	85	86	92	73	70	. . .	62
Percentage distribution of users according to the main [b] method currently used									
All current users . .	100	100	100	100	100	100	100	100	100
Pill . .	8	4	37	18	23	17	—	45	9
Intra-uterine device .	—	14	4	2	3	2	—	1	2
Diaphragm . .	.		9	7	—	1	7	2	. . .
Condom (sheath) . . .	6	19	30	39	36	12	16	23	5
Rhythm/safe period	34	3	2	6	4	12	4	19	8
Withdrawal (coitus interruptus)	44	51	7	24	17	49	65	9	69
Foam or other chemicals	3	5	1	1	2	—	2	1	1
Douche . .	5	1	—	—	.	3	5	—	—
Abstinence only			1	2	10	4	—	—	. . .
Other methods		3	9	.	5	—	. .	—	6

SOURCE: The Comparative Fertility Study.

[a] 1958 and 1963 marriage cohorts only.

[b] Where more than one method was stated as being used, the main method was the most important method (if reported as such by the respondent). Otherwise, it was the most efficient method from the following order of precedence: intra-uterine device, pill, diaphragm, condom, safe period, withdrawal, chemicals, douche.

velopment. In England and Wales and in Finland, the condom appears to have been the most popular method of contraception and its use was also of importance in Czechoslovakia, Denmark and the Netherlands. Apart from Denmark and the Netherlands (among recent marriage cohorts only in the latter case), the pill was used by less than one quarter of all users at the time of the investigations. Since the surveys in Belgium, in England and Wales and in Hungary took place as early as 1966 and 1967, it is probable that these percentages understate the current position. [13]

75. Yet, despite the apparent popularity of the relatively primitive methods of contraception, European couples do manage to control their family size, judging by the current low levels of achieved fertility. This finding seems to support the view that effectiveness of birth control is only partially a matter of the method chosen and that it also depends to a large extent upon how scrupulously the chosen method is applied.

76. Liberal abortion laws and the ready availability of clinical facilities have been responsible for frequent resort to pregnancy interruption as a method of fertility control in the socialist countries of Europe. A relaxation of the restrictions on legal abortions has also been observed recently in other regions of Europe, and it has probably contributed to the observed decline in fertility.

MORTALITY TRENDS AND AGE AND SEX DIFFERENTIALS IN EUROPEAN SUBREGIONS [14]

77. Some references to post-war trends in crude death rates in Europe and its subregions were made in paragraphs 12-21, where changes in the main components of population growth were examined. The present section employs life-table techniques to explore in greater detail the genuine changes in mortality levels and patterns, freed from the distorting effects of differences—over time and among countries—in the age and sex structure of the populations under study. Indeed, since the incidence of mortality varies greatly by age as well as by sex, the study of age and sex mortality differentials and changes therein has an interest of its own.

[13] A recent study in England and Wales suggests a figure of 27 per cent of current contraceptive users taking the pill in 1970, M. Bone, *Family Planning Services in England and Wales* (London, HM Stationery Office, 1973). According to J. Morsa and G. Julémont, "Une enquête nationale sur la fécondité", *Population et famille*, No. 25 (1971), the proportion who had "ever used" the pill in Belgium doubled between 1966 and 1971.

[14] In the preparation of this section, the secretariat of the Economic Commission for Europe was assisted by the Department of Dissemination of Statistical Information of the World Health Organization, which made available some statistical series derived from their data bank, as well as some unpublished reports on various aspects of mortality in and outside Europe.

Over-all trends in mortality and the impact of the age structure

78. Measured by the expectation of life at birth, gains in average longevity were significant in Europe during the 20-year period under study As shown in table 16, the expectation of life at birth rose by more than six years (for both sexes), from about 64.5 to about 71 years Improvement was even more marked in the Soviet Union, where the increment amounted to nearly 10 years. However, most of this improvement took place during the 1950s During the 1960s, the average gain was only 1.5 years for the whole of Europe (outside the Soviet Union) compared with about five years during the preceding decade This pattern affected all four subregions (as well as the Soviet Union), but it was particularly noticeable in the two more developed parts of Europe, referred to as Northern and Western Europe, where the expectation of life at birth rose by only one year between 1960 and 1970.

79 Another feature of the post-war development was a narrowing of the mortality differential between the various parts of Europe. Around 1950 there were still important differences between the subregions and the gap between Eastern Europe—the area with the lowest expectation of life—and Northern Europe—where it was the highest—exceeded eight years. By 1970, regional differences were much less significant [illegible]

80. The range of mortality levels is, of course, greater between individual countries. Around 1970, the shortest average length of life was that in Yugoslavia (67.5 years) and probably in Albania, and the longest that in Sweden (nearly 75 years).

81. The concept of the expectation of life at birth is independent of the actual structure of the population, and comparisons of life-table death rates (which are reciprocals of life expectations at birth) are more meaningful than those of crude death rates made in table 2 above. The two indicators are shown side by side in table 16 in order to correct the misleading impression of the regional and temporal differences in mortality levels indicated earlier by the crude death rates It now becomes clear that the relatively low crude death rates recorded in Eastern and Southern Europe, particularly around 1960 and 1970 when they were substantially lower than those in Northern and Western Europe, were due to the relatively young age structure of their populations [15] The progressive aging of populations was responsible for an increase in crude death rates in most subregions between 1960 and 1970, in spite of the real improvements in mortality as evidenced by changes in the age-specific death rates

Infant mortality

82 The statistical practice of the United Nations measures infant mortality by relating the number of deaths of infants below one year of age in a given year to the number of live births in that year [16] Such rates, referring to three-year averages around 1950, 1960 and

[15] Part of the decline in the crude death rates in Eastern Europe and the Soviet Union between 1950 and 1960 must have been due to the sharp decline in fertility during this period, given the high mortality among infants It will be noticed, however, that the life-table rates are consistently higher than the crude rates in all regions and throughout the period This is because the age structure of the stationary populations resulting from the current age-specific death rates and a constant number of annual births is more "aged" than [illegible]

TABLE 16 EXPECTATION OF LIFE AT BIRTH AND COMPARISON OF CRUDE AND LIFE-TABLE DEATH RATES BY SUBREGION, AROUND 1950, 1960 AND 1970

(Years and rates per 1,000 population)

Subregion [a]	*Expectation of life at birth*			*Life-table death rates* [b]			*Crude death rates*		
	1950	*1960*	*1970*	*1950*	*1960*	*1970*	*1950*	*1960*	*1970*
Eastern Europe	60.6	68.0	69.9	16.5	14.7	14.3	11.6	9.3	10.2
Northern Europe	69.0	71.4	72.5	14.5	14.0	13.8	11.2	11.0	11.2
Western Europe	67.1	70.4	71.4	14.9	14.2	14.0	11.2	11.1	11.2
Southern Europe	62.5	68.0	70.4	16.0	14.7	14.2	10.6	9.6	9.3
Total Europe (excluding USSR)	64.5	69.4	70.9	15.5	14.4	14.1	11.1	10.3	10.4
USSR	60.6	68.5	70	16.5	14.6	14.3	9.7	7.1	8.2

SOURCES United Nations, *Demographic Yearbook*, various issues, and World Health Organization data bank; direct communication from the Government of Greece, *Vestnik Statistiki*, No 1 (1972), estimates by secretariat of the Economic Commission for Europe (for life table data at 1950, 1960 and 1970)

[a] Subregions include the following countries

Eastern Europe Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania

Northern Europe: Denmark, Finland, Ireland, Norway, Sweden United Kingdom

Western Europe. Austria, Belgium France, Federal Republic of Germany, Netherlands, Switzerland

Southern Europe: Greece, Italy, Portugal, Spain, Yugoslavia

[b] Reciprocals of life expectations at birth

TABLE 17. INFANT MORTALITY RATES DURING THE FIRST 28 AND 365 DAYS, BY SUBREGION, AROUND 1950, 1960 AND 1970

Subregion[a] and period	Rates per 1,000 live births around			Percentage change in rates		
	1950	1960	1970	1950-1960	1960-1970	1950-1970
Eastern Europe						
28 days	48	23	19	−58	−17	−61
365 days	98	53	33	−46	−38	−66
Northern Europe						
28 days	19	16	12	−16	−25	−37
365 days	33	22	17	−33	−23	−47
Western Europe						
28 days	28	19	14	−32	−26	−51
365 days	52	29	20	−46	−31	−60
Southern Europe						
28 days	32	25	19	−22	−24	−41
365 days	81	56	36	−31	−35	−56
Total Europe (excluding USSR)						
28 days	33	21	16	−36	−24	−52
365 days	70	42	28	−40	−33	−60
USSR						
28 days	..	...	...	...	...	...
365 days	84	36	24	−57	−33	−71

SOURCES: United Nations, *Demographic Yearbook*, various issues; and World Health Organization data bank.

[a] Subregions include the following countries:

Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.

Northern Europe: Denmark, Finland, Iceland, Ireland, Norway, Sweden, United Kingdom.

Western Europe: Austria, Belgium, France, Federal Republic of Germany, Luxembourg, Netherlands, Switzerland.

Southern Europe: Greece, Italy, Malta, Portugal, Spain, Yugoslavia.

1970, are shown in table 17 for Europe as a whole and its constituent subregions. The table also shows the incidence of mortality during the first 28 days of life, calculated again in relation to the annual number of births. The latter index is subject to a significant margin of error, since it is very sensitive to differences in death registration procedures, in the degree of under-registration and in the definition of stillbirths.

83. Infant mortality rates are often looked upon as indexes of economic and social progress, since they react quickly to improvements in the economic and social conditions of life much more than does mortality at older ages or the average expectation of life at birth. There are grounds for believing, however, that in the most developed countries of Europe, limits to further improvement in infant mortality through social progress have virtually been reached and that further gains can only occur through the reduction of neo-natal mortality associated with endogenous rather than exogenous causes. The data of table 17 lend some support to this hypothesis.

84. First of all, a wide interregional variation in infant mortality at the beginning of the period under study will be noticed. Around 1950, only about 30 babies of 1,000 born alive were dying within a year in Northern Europe and about 50 in Western Europe, but in the two less developed areas the corresponding figures were 80 and 100. By 1970, Eastern and Southern Europe appear to have almost exactly reached the level recorded in Northern Europe in 1950, whereas in Northern and Western Europe, infant mortality fell to around 20 or less. In individual countries, the range was of course wider, from less than 12 in Sweden to nearly 60 in Portugal. In absolute terms, the saving in lives was much greater during the earlier than during the later decade, and this was also true—though to a much lesser extent—with regard to relative changes, as the second half of table 17 indicates.

85. These achievements in infant mortality were almost paralleled by trends in mortality during the first month of life. There was, however, a decline in the rate of improvement in neo-natal mortality compared with infant mortality, particularly in Northern and Western Europe. Around 1950, about one half of all deaths occurring within the first year of life in fact took place during the first month, in these two subregions, but the proportion went up to more than two thirds in 1970.

86. In all European countries (except in Albania where data are probably defective), infant mortality is considerably higher among males than among females, the excess appearing to be negatively correlated with the over-all mortality level Thus, in Denmark and Sweden, the margin of excess amounts to some 30-40 per cent of the female rates.

Sex and age differentials in mortality

87. Women live, on average, longer than men. This is an almost universal phenomenon which appears to be more pronounced among the developed than among the developing countries Indeed, the recent European subregional data tend to confirm the existence of a positive correlation between economic development and excess male mortality (see table 18) It will be noticed, first, that the gap between the male and the female expectations of life at birth widened for the whole of Europe from 4 1 years in 1950 to 6.1 years in 1970, and that there was a systematic upward trend in all four subregions, as well as in the Soviet Union. Thus, at least in absolute terms, gains in mortality were considerably greater among women than among men

88. For each sex, the rate of improvement in mortality rates was much more rapid during the 1950s than in the 1960s, and it was generally faster in the less than in the more developed areas. In Northern Europe, during the past decade, the expectation of life at birth among men had risen by only half a year and in Eastern Europe by less than one year.[17] The increments were considerably greater among women. By 1970, the interregional variation was narrower both among men and among women, the expectation of life at birth ranging from 67 to 69 years for men and from 72.5 to around 75 among women

89 The excess male mortality appears to apply to all the age groups and regions of Europe shown in table 19, which compares the probability of dying between selected ages for each sex around 1960 and 1970 With few exceptions, the excess is greater among the more than among the less developed areas of Europe throughout the age range. In general, it appears to be smallest among children (some 10-25 per cent) and largest among young adults (40-50 per cent) Between 1960 and 1970, excess male mortality was increasing everywhere and at all ages, but the rate of increase was greater in Eastern and Southern Europe than in the more advanced areas.

90 Table 19 also makes it possible to compare trends in age-sex specific mortality over the 1960-1970 decade and between the subregions It will be seen that spectacular improvements in mortality rates were achieved during this period at the youngest ages Trends in infant mortality were described in paragraphs 82-85, but significant improvements also took place among children aged 1-5, particularly in Southern Europe where mortality at these ages was almost cut by half On the other hand, improvements—if any—were only slight for younger adults, and became zero or even negative for middle-aged and older persons, particularly men.

91 As for interregional comparisons, the data indicate that by 1970 the probability of dying at the youngest ages was lower in Northern and Western Europe than in other regions, but the differences became rather blurred among young adults and old people Thus, Western Europe shows the highest mortality among all subregions in the 5-25 years age group, and Southern Europe the lowest mortality at older ages, at least among men.

92. A closer examination of interregional differences by smaller age groups and by main causes of death

[17] In many individual countries, male life expectancy ceased to improve recently, and in some (Belgium, Czechoslovakia, the Netherlands and Norway) it even fell slightly

TABLE 18 EXPECTATION OF LIFE AT BIRTH, BY SEX AND SUBREGION, AROUND *1950*, *1960* AND *1970*

(Years)

Subregion [a]	1950 Males (1)	1950 Females (2)	1950 Col 2– Col 1 (3)	1960 Males (4)	1960 Females (5)	1960 Col 5– Col 4 (6)	1970 Males (7)	1970 Females (8)	1970 Col 8– Col 7 (9)
Eastern Europe	58 5	62 9	+4 4	65.8	70 4	+4 6	67 1	72.5	+5 4
Northern Europe	66 7	70 9	+4 2	68 5	73.5	+5 0	69 0	75.2	+6 2
Western Europe	64 5	69 0	+4.5	67.1	73 0	+5 9	68 0	75.2	+7.2
Southern Europe	60 2	63 7	+3 5	65 8	70 4	+4 6	68 0	73.5	+5.5
Total Europe (excluding USSR)	62 1	66 2	+4 1	66 7	71 9	+5.2	68 0	74 1	+6 1
USSR	58 2	63 3	+5 1	65 0	72 6	+7.6	66	74	+8

SOURCES United Nations, *Demographic Yearbook*, various issu [illegible]
[illegible]
E [illegible] man Demo-
[illegible]

Northern Europe Denmark, Finland, Ireland, Norway, Sweden, United Kingdom
Western Europe: Austria, Belgium, France, Federal R[illegible] lic of Germany, Netherlands, Swit[illegible]
Southern Europe, Greece, Italy, P[illegible]

TABLE 19. PROBABILITIES OF DYING (× 10,000) BETWEEN SPECIFIED AGES, BY SEX AND SUBREGION,[a] AROUND 1960 AND 1970

Age		Eastern Europe			Northern Europe			Western Europe			Southern Europe		
		1960	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*	*1960*	*1970*	*Percentage change*
0-1	Males	572	379	−34	249	195	−22	334	217	−35	588	409	−30
	Females	465	298	−36	191	149	−22	259	166	−36	503	340	−32
	F as percent of M	*81*	*79*		*77*	*76*		*77*	*76*		*85*	*83*	. .
1-5	Males	77	58	−25	42	33	−22	55	40	−28	130	59	−55
	Females	70	50	−29	33	25	−24	44	31	−30	129	55	−58
	F as percent of M	*91*	*86*		*79*	*77*		*81*	*79*		*99*	*94*	.
5-25	Males	208	184	−12	148	139	− 6	182	194	+ 6	185	166	−10
	Females	110	90	−19	72	69	− 4	86	88	+ 2	119	86	−28
	F as percent of M	*53*	*49*		*48*	*49*		*47*	*45*		*64*	*52*	. . .
25-45	Males	471	513	+ 9	369	354	− 4	450	464	+ 3	444	423	− 5
	Females	313	262	−16	250	223	−11	275	245	−11	312	237	−24
	F as percent of M	*66*	*51*		*68*	*63*		*61*	*53*	.	*70*	*56*	. . .
45-65	Males	2,366	2,409	+ 2	2,412	2,395	− 1	2,481	2,396	− 3	2,250	2,189	− 3
	Females	1,487	1,396	− 6	1,393	1,337	− 4	1,373	1,258	− 8	1,381	1,233	−11
	F as percent of M	*63*	*58*		*58*	*56*		*55*	*52*		*61*	*56*	. . .
65-75	Males	3,888	4,069	+ 5	3,993	4,044	+ 1	3,877	3,982	+ 3	3,641	3,698	+ 2
	Females	2,909	2,797	− 4	2,630	2,415	− 8	2,603	2,376	− 9	2,678	2,454	− 8
	F as percent of M	*75*	*69*		*66*	*60*		*67*	*60*	. .	*74*	*66*	. . .

SOURCE: World Health Organization data bank.

[a] Subregions include the following countries:
Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.
Northern Europe: Denmark, Finland, Ireland, Norway, Sweden, United Kingdom.
Western Europe: Austria, Belgium, France, Federal Republic of Germany, Netherlands, Switzerland.
Southern Europe: Greece, Italy, Portugal, Spain, Yugoslavia.

shows that the interregional differences are, in fact, quite small in the 5-15 age group but considerable among the ages 15-25, especially among men In the latter age group, deaths from accidents predominate, and their incidence appears to be much higher in Western than in Northern Europe In France, for instance, the death rates from accidents among men aged 15-25 are twice as high as those in England and Wales The ratio was similar among women for whom the accident-caused deaths are about one third of that among men in either country.

93. The relatively low mortality levels recorded among older men in Southern Europe seem to be explained by the low incidence there of malignant neoplasms, heart diseases and accidents.

94. A more thorough explanation of interregional differences, and recent departures from what seemed to be a well-established pattern, would require a detailed analysis of mortality by causes of death which lies beyond the scope of this paper.

Post-war migratory movements in Europe

95. In several European countries, external migration has become a major factor in population developments In a number of countries, emigration has absorbed a major share of the natural population increase, and in some cases it has even led to a decline in population In other countries, immigration has substantially contributed to population growth.

96. Net migration balances for individual countries have been derived from the difference between the change in the total population and the excess of live births over deaths (or natural population increase) for the period considered. The sources of these data are the total population estimates based on the most recent census and vital statistics records in the group of countries covered. In some cases, however, distortions arise, for instance, when *de jure* population is referred to in the absence of data on *de facto* population.

97 Net migration balance has a limited meaning in countries where emigration of nationals and immigration from abroad exist simultaneously. The United Kingdom is, perhaps, the only important such case in the group of countries covered. Further, in several countries, where temporary migration prevails, the net migration balance could conceal huge movements of migration and repatriations within the period in question.

Net migration balances

98 The period 1950-1970 closed with a negative migration balance of approximately 3 5 million for the whole of Europe (outside the Soviet Union) vis-à-vis other continents (The United States had a net immigration roughly double that figure.) However, most of the net emigration from Europe (some nine tenths) was concentrated in the decade 1950-1960. In the 1960s, net emigration from Europe fell to a negligible level (see table 20)

99 Contrasting patterns are shown for the four European subregions Western Europe had a net immigration balance of 7 7 million, while Eastern Europe and Southern Europe lost, respectively, 3.6 million and 6 7

Table 20 Net migration balances in the four subregions of Europe, 1950-1970

(Thousands)

Subregion	*Period covered (end-of year data)*	*Total population increase*	*Natural population increase*	*Implied net migration balance*
Eastern Europe	1950-1960	8,359	10,739	−2,380
	1960-1970	6,071	7,326	−1,255
	1950-1970	14,430	18,065	−3,635
Northern Europe	1950-1960	3,878	4,268	− 390
	1960-1970	4,199	4,839	− 640
	1950-1970	8,077	9,107	−1,030
Western Europe	1950-1960	11,324	8,202	3,122
	1960-1970	13,718	9,144	4,574
	1950-1970	25,042	17,346	7,696
Southern Europe	1950-1960	8,900	12,483	−3,583
	1960-1970	9,901	12,995	−3,094
	1950-1970	18,801	25,478	−6,677
Total Europe (excluding USSR)	1950-1960	32,461	35,692	−3,231
	1960-1970	33,889	34,304	− 415
	1950-1970	66,350	69,996	−3,646

Source United Nations, *Demographic Yearbook*, various issues, and national stat

million. Virtually all countries of Western Europe were immigration countries and all countries of Eastern and Southern Europe were emigration countries. Northern Europe is a less homogeneous subregion, with one receiving country, Sweden, two traditional countries of emigration, Finland and Ireland, and another country, the United Kingdom, losing native population through emigration and, at the same time, receiving immigrants.[18]

100. There is a fundamental difference between emigration streams from Eastern Europe and those from Southern Europe. Emigration from countries of Eastern Europe had, as a rule, political motivations, while emigration from Southern Europe mainly took place for economic reasons. In the first years of the 1950s, emigration from countries of Eastern Europe was still in part a continuation of the post-war population movements caused by the redrawing of frontiers, the transfer of sovereignty and changes of régime.[19] Almost 80 per cent of net emigration from Eastern Europe in the 1950s was accounted for by emigration from the German Democratic Republic. Minor emigration streams, ignored or reluctantly tolerated by the authorities of the countries concerned, continued throughout, while new peaks were reached in Hungary in 1956 and Czechoslovakia in 1968 in connexion with the political events. Net emigration from Eastern Europe almost halved between the 1950s and the 1960s.

101. Numerically, immigration in Europe was concentrated in a very limited number of countries. Two countries only, the Federal Republic of Germany and France, accounted for 6.9 million, out of the net immigration balance of all European receiving countries of 8.2 million (see table 21). Over one third of the total population increase in these two countries between 1950 and 1970 could be attributed to immigration. Net immigration into France increased by almost 70 per cent from the first to the second decade, due largely to the wave of repatriation from Algeria in 1962. In the Federal Republic of Germany, immigration from Eastern Europe was halted in 1961, but was rapidly replaced by an inflow from Southern Europe and Turkey.

102. However, the relative impact of immigration was greatest in a smaller country, Switzerland, where 43 per cent of the total population increase could be accounted for by migration. In Belgium and Sweden, also, immigration contributed substantially (respectively

[18] In the United Kingdom, in the 1950s, emigrants and immigrants roughly balanced at around 800,000 persons. In the 1960s, about 1.4 million persons born in the United Kingdom emigrated and some 900,000 foreign-born came in. K. Jones and A. D. Smith, *The Economic Impact of Commonwealth Immigration*, p. 2; and C. A. Moser, "Statistics about immigrants", *Social Trends*, No. 3 (1973).

[19] Between 1945 and 1950 the net emigration from countries of Eastern Europe was probably on the order of 2.5 million to 3.0 million. A full account of the migratory movement which took place after the Second World War for political reasons is given in International Labour Office, *International Migration 1945-1957*, Studies and reports, new series, No. 54 (Geneva, 1959).

TABLE 21. IMMIGRATION AND POPULATION GROWTH IN MAIN COUNTRIES OF IMMIGRATION, 1950-1970

Country	Period (end-of-year data)	Total population increase (thousands)	Net immigration: Thousands	Net immigration: Percentage of population increase	Annual percentage rates of population growth: Including immigrants	Annual percentage rates of population growth: Excluding immigrants
Belgium	1950-1960	510	81	15.9	0.6	0.5
	1960-1970	537	180	33.5	0.6	0.4
	1950-1970	1,047	261	24.9	0.6	0.4
Germany, Federal Republic of	1950-1960	4,558	1,793	39.3	0.9	0.5
	1960-1970	5,308	1,941	36.6	1.0	0.6
	1950-1970	9,866	3,734	37.8	0.9	0.6
France	1950-1960	4,027	1,173	29.1	0.9	0.7
	1960-1970	5,087	1,976	38.8	1.1	0.7
	1950-1970	9,114	3,149	34.6	1.0	0.7
Sweden	1950-1960	458	93	20.3	0.6	0.5
	1960-1970	575	215	37.4	0.7	0.5
	1950-1970	1,033	308	29.8	0.7	0.5
Switzerland	1950-1960	708	334	47.2	1.4	0.8
	1960-1970	851	344	40.4	1.5	0.9
	1950-1970	1,559	678	43.5	1.4	0.8

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national statistics.

25 and 30 per cent) to population growth between 1950 and 1970.

103. These crude figures neglect the effect of immigration on the rate of natural population increase in receiving countries. This effect is felt mainly through changes in the shape of the age pyramids in favour of the reproductive age groups, especially when immigration is of a permanent nature.[20]

104. Virtually all countries of Eastern Europe and Southern Europe were countries of emigration in the period 1950-1970 In Northern Europe, only Finland and Ireland were steadily emigration countries The *United Kingdom also showed a negative migration* balance (of about 500,000), but this was the result of significant movements of both emigrants and immigrants. In other cases, the negative balance was small and could reflect some statistical discrepancy in the basic data used for the calculation.

105. The extent to which population growth in the main 11 countries of emigration has been affected by the outward flow is shown in table 22

106. Emigration led to a decline in total population in the German Democratic Republic (in both decades), in Ireland in the 1950s and in Portugal in the 1960s In the German Democratic Republic emigration was, in the 1950s, equivalent to two and a half times the natural population increase. In Finland and Greece, where the rate of emigration accelerated from the first to the second decade, it amounted to almost one half of the excess of births over deaths in the 1960s. In Italy and Spain, it cancelled over a quarter of the natural population increase in the 1950s, but then fell considerably in the 1960s.

107. A clear and unequivocal correlation between natural population increase and migration cannot be expected, since a number of other factors are at work in determining migration pressures. However, it can be observed that, on the whole, the receiving countries had a relatively low natural population increase, while most of the countries of origin had a larger excess of births over deaths, the exceptions being countries of political emigration (tables 21 and 22)

108 Without migration, the populations of Western and Southern Europe would have grown at an annual rate of, respectively, 0 7 and 1.1 per cent. Because of migration, it grew, respectively, by 0.9 and 0 8 per cent per annum However, in Switzerland, the population increased at a record rate of 1 4 per cent per annum, largely due to immigration.

109. An examination of the regional pattern of population change revealed that, within the countries of emigration, it was the poorer areas that suffered the greatest population loss.[21] These regions underwent a real depletion, not only in absolute terms, but also in terms of age and sex structure. This led to a fall in the rate of natural population increase in some of the sending regions

Main migration streams

110 The net emigration balance for the whole of Europe is estimated to have fallen from 3.2 million in the 1950s to 0 4 million in the 1960s. This, at first glance, suggests a decrease of emigration to other continents, or a relative increase in immigration from other continents

111 Although immigration from non-European countries became important in the 1960s, it was, in fact, intra-European migratory movements that gained momentum in the late 1950s and the 1960s. The traditional outlets for emigration from southern Europe—to Latin America, Australia, Canada and the United States of America—lost ground in favour of countries of Western and Northern Europe

112 This shift was brought about by a steep increase in the demand for labour in several of the highly industrialized countries of Europe, associated with only a moderate growth in their own domestic labour supply. In its turn, the latter was due to the following reasons: first, the relatively low rate of population growth; secondly, the unfavourable development of the age structure of the population (population of working age increasing less than total population); thirdly, the decline in over-all activity rates connected with longer schooling, earlier retirement and, in many cases, a decline in female participation rates; fourthly, the trend towards shorter working hours; and, lastly, [illegible] for lower paid, menial [illegible]

employment[22]

113. The intensification of intra-European population movements was accompanied by two other, not unconnected, features: in a number of cases, migration of workers tended to prevail over migration of entire families, and thus temporary migration tended to prevail over permanent migration. Short-term migration was also helped by shorter distances and also by immigration policies in certain receiving countries, where limits were imposed on the duration of employment contracts, on periods of residence, on the right of a worker to bring in his family etc.

[20] This factor cannot be covered in the present study, but one extreme example can be quoted In Luxembourg, in recent years, deaths exceeded births among the native population, while the excess of births over deaths was important among immigrants Without the contribution of immigrants, the natural change in the population would have been negative.

[21] For example, in the [illegible] migration from the [illegible] Portugal was [illegible] higher than its natural [illegible] increase In the Greek Peloponnesus, the Ionian and [illegible] Islands, it was [illegible] and a half times higher Because [illegible] population [illegible] heavily in all the regions [illegible] Finland, Greece, Ireland and Portugal [illegible] several [illegible] regions in Spain and southern Italy [illegible] loss in population was experienced in several [illegible] regions of countries which had a positive balance [illegible] as a consequence of internal migration.

[22] *Economic Survey of Europe in 196*[illegible] (United Nations publication, Sales No. E.69.II.E.1), chapter [illegible] of labour [illegible] in Europe".

TABLE 22. EMIGRATION AND POPULATION GROWTH IN MAIN COUNTRIES OF EMIGRATION, 1950-1970

Country	Period (end-of-year data)	Natural population increase (thousands)	Net emigration: Thousands	Net emigration: Percentage of natural population increase	Annual percentage rates of population growth: With emigration	Annual percentage rates of population growth: Without emigration
Czechoslovakia	1950-1960	1,239	— 30	—	0.9	1.0
	1960-1970	807	174	21.6	0.4	0.6
	1950-1970	2,046	144	7.0	0.7	0.8
Finland	1950-1960	486	70	14.4	1.0	1.2
	1960-1970	329	153	46.5	0.4	0.7
	1950-1970	815	223	27.4	0.7	0.9
German Democratic Republic	1950-1960	752	1,824	242.6	—0.6	0.4
	1960-1970	411	563	137.0	—0.1	0.2
	1950-1970	1,163	2,387	205.2	—0.4	0.3
Greece	1950-1960	958	206	21.5	0.6	0.8
	1960-1970	830	378	45.5	0.7	0.9
	1950-1970	1,788	584	32.7	0.7	0.8
Hungary	1950-1960	788	162	20.6	0.6	0.8
	1960-1970	339	10	2.9	0.3	0.3
	1950-1970	1,127	172	15.3	0.5	0.6
Ireland	1950-1960	263	400	152.1	—0.5	0.9
	1960-1970	289	160	55.4	0.4	1.0
	1950-1970	552	560	101.4	—0.0	0.9
Italy	1950-1960	4,025	1,183	29.4	0.6	0.8
	1960-1970	4,429	731	16.5	0.7	0.9
	1950-1970	8,454	1,914	22.6	0.7	0.8
Poland	1950-1960	4,983	196	3.9	1.8	1.8
	1960-1970	3,157	381	12.1	0.9	1.0
	1950-1970	8,140	577	7.1	1.3	1.4
Portugal	1950-1960	1,091	698	64.0	0.4	1.2
	1960-1970	1,073	1,239	115.5	0.2	1.1
	1950-1970	2,164	1,937	89.5	0.3	1.1
Spain	1950-1960	3,328	874	26.3	0.8	1.1
	1960-1970	3,891	498	12.8	1.2	1.2
	1950-1970	7,219	1,372	19.0	0.9	1.2
Yugoslavia	1950-1960	2,621	584	22.3	1.2	1.5
	1960-1970	2,213	257	11.6	1.0	1.1
	1950-1970	4,834	841	17.4	1.1	1.3

SOURCES: United Nations, *Demographic Yearbook*, various issues; and national statistics.

114. Immigration from non-European countries became important in the 1960s, mainly through the emergence of immigrants from Turkey (especially into the Federal Republic of Germany) and through the immigration from former colonies or overseas territories (Belgium, France and the United Kingdom). The repatriation from Algeria produced a peak net immigration into France of 860,000 in 1962. Immigration of north Africans into France and of people from the "new Commonwealth" into the United Kingdom reached significant levels, before restrictive regulations were enforced.[23]

115. Belgium, the Federal Republic of Germany and the Netherlands received a number of north African immigrants, mainly employed in such sectors as mining,

[23] Net immigration from the Commonwealth was about 300,000 in the 1950s and 600,000 in the 1960s, accounting for one third and two thirds of total immigration of foreign labour during the two decades, respectively. K. Jones and A. D. Smith, *op. cit.*; and C. A. Moser, *loc. cit.*

deserted even by south European immigrants. The total number of north African immigrants in Europe, mainly Algerians, Moroccans and Tunisians, is probably not far short of 1.2 million, and that of Indians and Pakistanis around 700,000.[24]

116. With the fragmentary data available, it is not possible to compile a full matrix of intra-European migration. However, it is possible to identify broad movements of intercountry migration.

117. The data suggest that most of the migrants from Ireland went to the United Kingdom, and that, broadly, two thirds of the immigrants into Sweden came from the nearby Nordic countries, mainly Finland, while the remainder originated from southern Europe. It is possible to trace the destination of the 2 million Italian emigrants to countries of Western and Northern Europe, especially to Belgium, the Federal Republic of Germany, France, Switzerland and Sweden The largest group of people emigrating from Greece in the 1960s went to the Federal Republic of Germany. A large number of Portuguese emigrants (perhaps one half) were received by France. The main outlets for Yugoslav emigration were Austria and the Federal Republic of Germany.

Incidence of migrant labour

118. With the intensification of intra-European migration in the 1960s, the temporary migration of workers has in several countries become prevalent over the permanent transfer of entire family groups out of their native lands. Thus, in the receiving countries the contribution of immigration to the growth of the labour force has been much greater than their contribution to the increase in total population.

119. A number of sources are in agreement in estimating that there currently are about 7 million foreign workers in Northern and Western Europe. But even these estimates are conservative and understate the probable size of this group. Even where countries supply accurate statistics of the number of foreign workers who are subject to control or otherwise recorded, considerable numbers of immigrants tend to escape statistical measurement: undetected tourists or students who take up some kind of employment; workers' wives employed part-time, etc. Another uncertainty in the count derives from the definition of the attribute of "foreigner". The long-standing inflow of people from former overseas territories (particularly in Belgium, France and the United Kingdom) has been regarded essentially as internal migration In the Federal Republic of Germany, the expellees and refugees are considered to be nationals, although representing effective immigration across the present boundaries of the country. Foreign-born people who acquire the nationality of the receiving country obviously lose the attribute of foreigners. Furthermore, the count of foreigners becomes increasingly difficult with the free circulation of people within such economically integrated areas as the Nordic Free Market and the European Economic Community

120. Table 23 shows the number of foreign workers in eight major receiving countries, related to the employed labour force in these countries. The 7 million foreign workers represent, altogether, some 8 per cent of the employed labour force in the receiving countries (but as much as 30 per cent in Switzerland). However, the recruitment of immigrant workers accounted for the bulk of the 10 million increase in employment in the receiving countries in the period 1950-1970 In the Federal Republic of Germany and Switzerland, the increase in the foreign labour force was, in absolute terms, far larger than the increase in the total labour force

121 In most cases, migration is made up of breadwinners, leaving their families in the home countries, and is of a temporary nature. In such countries as the Federal Republic of Germany and Switzerland, where the immigration of workers, rather than of entire family groups, has prevailed, the rate of turnover of immigrants was, in the late 1960s, extremely high It has been estimated that, in the period 1961-1965, out of every 10 immigrants arriving in the Federal Republic of Germany and Switzerland, respectively, 6 and 8 of them

TABLE 23 THE SHARE OF FOREIGN LABOUR IN MAIN COUNTRIES OF IMMIGRATION AROUND 1972[a]

	Number of foreign workers[b] *(a)*	*Employed labour force* *(b)*	*(a) × 100 / (b)*
	(thousands)		
Austria	204	3,270	6 2
Belgium	217	3,700	5 9
France	1,254	19,962	6 3
Germany, Federal Republic of	2,340	26,954	8 7
Netherlands	190	4,677	4 1
Sweden	218	2,838	7 7
Switzerland	890	2,947	30.2
United Kingdom	1,782	25,637	7 0

SOURCES Column (*a*) Belgium, Netherlands and Sweden: Internat[illegible] Confere[illegible] (Geneva[illegible] No 3[illegible]
(*b*) national sources

[a] Mid-year 1972 for the Federal Republic of Germany, the Netherlands and Sweden, August 1972 for Austria and Switzerland, annual average 1971 for Belgium, 1968 census for France, 1973 for the United Kingdom

[b] For Austria, workers "under quota", for Belgium and the Neth[illegible] for[illegible] and[illegible] terr[illegible] Germany, "work permits" only; for Sweden, "registered" foreign workers only, for the United Kingdom, foreign-born workers, including people from the Commonwealth, colonies and protectorates, for Switzerland, all categories, covering (in thousands). 242 "established", 197 seasonal, 355 annual and 97 "border-crossing" workers

[24] This is an estimate, referring to 1973, published by the International Catholic Migration Commission, *Migration News*, No 3 (1973).

left.[25] That is, out of the 2.8 million workers arriving in these countries in the five-year period, as many as 1.8 million left. The temporary nature of migration, with a short average stay, has a number of important positive and negative implications for the economies of countries of departure and of destination.

Labour migration prospects

122. There is clear evidence that demand for foreign labour will persist in several European countries within the next decade or two, and that this will, to a large extent, be due to the demographic factors restricting the supply of domestic labour. As shown in the other sections of this study, as a consequence of fertility trends population of working age, particularly that at younger ages, will generally grow slowly in the late 1970s and in the 1980s, and in some countries it will remain stationary or may even decline. Moreover, in the industrialized countries, agriculture has already ceased to perform its traditional function as a labour reservoir for industrial employment. This source is gradually being exhausted also in other parts of Europe.

123. In the socialist countries of Europe, employment of women has very nearly reached its potential limits, whereas the scope for an increase of female employment has already considerably narrowed in the West. Everywhere and for some time now, extension of compulsory schooling and earlier retirement have tended to reduce activity rates at the two ends of the working-age range. This process is likely to accelerate in the less developed countries of the region also.

124. Thus, the persistence of labour scarcities, particularly with respect to unskilled or semi-skilled labour, in the receiving countries of immigration in Western and Northern Europe, will be accompanied by a marked weakening of the available surpluses in the traditional countries of emigration, such as Finland, Ireland, Italy or Spain. In Greece, Portugal and Yugoslavia, emigration pressure is likely to continue for a time, probably at a reduced rate. Unless migration policies change drastically in some east European countries, Turkey and perhaps some north African countries are likely to become the main reservoir for the labour-hungry economies of industrial Western and Northern Europe.

125. However, in discussing the future volume of migration, the importance of non-economic factors should not be ignored. Governments are becoming increasingly concerned with the social and political implications of migratory movements and this may well militate against any future expansion.

Expected trends in population size and age structure, 1970-2000

126. The estimates of future population trends presented and analysed in this section derive for most countries from the nationally prepared projections, based as a rule on the results of the 1970 round of population censuses.[26] One-variant projections (based on the assumption of constant 1970 levels of fertility and mortality) were prepared by the secretariat for Austria, Denmark, Greece, Ireland and Italy, i.e., countries for which no 1970-based official projections have as yet been released.[27] For Albania, the German Democratic Republic and the Soviet Union, resort has been made to the recent estimates prepared by the United States Bureau of the Census in several variants.

127. Some countries had indicated their preference for a set of assumptions considered "the most probable variant". For other countries, the middle variant was as a rule accepted as the most likely, but rather arbitrary decisions had to be made for countries providing two or four variants.

128. The treatment of the migration component was not uniform in the nationally prepared projections. Among the sets of projections discussed in this paper, a small allowance for emigration was made for Finland and Spain, and one for immigration for Switzerland. Migration was omitted in the projections prepared by the secretariat.

Expected trends in the components of population growth

129. In most national projections, the basic assumptions concerning future trends in mortality and fertility were made with reference to expectation of life and gross reproduction rates (and/or age-specific rates), respectively. These assumptions are summarized in table 24 with respect to the "most probable" variant chosen for further analysis. It will be seen that in two countries—the Federal Republic of Germany and Hungary—expectation of life at birth was assumed to remain constant at the 1970 level throughout the 30-year period. In Spain, where expectation of life appears to have been surprisingly high in the late 1960s, a slight further improvement was foreseen. In Finland, projections assume a slight increase in the life-table mortality for both sexes. In the Netherlands, where mortality projections were prepared by cause of death, a decline in the expectation of life of males from 70.9 years in 1966-1969 to 69.5 in 1980 is foreseen. In other countries, more optimistic forecasts have been made. Thus, in Sweden, Switzerland and the United Kingdom, it is expected that female expectation of life will exceed 78 years in the year 2000. A considerable fall in mortality levels is also postulated in the nationally prepared Polish and Romanian projections, as well as into those for the German Democratic Republic and the Soviet Union prepared by the United States Bureau of the

[25] See *Economic Survey of Europe in 1965* (United Nations publication, Sales No. 66.II.E.1), p. 79. Seasonal workers are excluded from the calculation.

[26] Some of these projections have appeared in print. For most countries (13 in all), however, the secretariat benefited from advanced tabulations supplied by the Statistical Offices concerned.

[27] It was also necessary, in order to obtain subregional totals, to extend the official projections for Bulgaria (from 1980 to 2000) and for Portugal (from 1990 to 2000).

TABLE 24 ASSUMPTIONS UNDERLYING THE "MOST PROBABLE" VARIANTS OF NATIONAL PROJECTIONS, 1970-2000
(A) GROSS REPRODUCTION RATES; (B) EXPECTATIONS OF LIFE AT BIRTH

Subregion and country	(A) Gross reproduction rates				(B) Expectation of life at birth (years)							
	Around 1965-1970	1975-1980	1985-1990	1995-2000	Around 1965-1970		1975-1980		1985-1990		1995-2000	
					Male	Female	Male	Female	Male	Female	Male	Female
Eastern Europe												
Czechoslovakia	1 02	1 02	1 02	1 02	67 3	73 6	66 9	73 3	67.8	74 0	68 7	74 7
German Democratic Republic	1 03	1 03	1 03	1 03	68 2	73 4					69 8	76 4
Hungary	0 97	0 99	1 01	1.01	66 6	71 9	Constant at 1969-1970 level					
Poland	1 11	0 94	0 89	0 91	66 9	72 8	67 9	73 6	69 4	74 8	71.8	76 4
Romania	1 49	1 20	1 20	1.20	65 5	69 8					71.2	75 0
Northern Europe												
Finland	1 03	0 76	0 73	0.73	65 7	73 6	65 5	72 0	Constant at 1975-1980 level			
Sweden	1 05	0 97	0 97	0 97	72 0	76 9					72 3	78.2
United Kingdom	1 24	1 16	1 14	1 13	67 8	73 8	69 6	75 9	70 7	77 1	71 6	78 0
Western Europe												
Germany, Federal Republic of	1 18	0 84	0 84	0 84	67 4	73 5	Constant at 1967-1969 level					
Netherlands					70 9	76 3	70 2	76 5	69 5	76 6	Constant	
Switzerland[a]	1 12	0 90	0 86	0 82	70 0	76 0	70 4	75 8	71 7	77 3	73 0	78 9
Southern Europe												
Spain	1 40	1 38	1 35	1 31	69 0	74 4	69 6	74 7	Constant at 1975-1980 level			
Yugoslavia	1 21	1.11	1.10	1 11	64 3	68 9	66 4	70 5	67 6	71 4	68.5	72 1
USSR	1 18		1 08	1 08	66	74					67.8	77 6

SOURCES United Nations, *Demographic Yearbook*, various issues; and national sources
[a] Projected figures are for Swiss nationals only.

Census It should be stressed that the stability or increase in age-specific mortality at older ages, observed recently in some countries, makes future mortality trends more uncertain and hazardous than they were in the recent past. This probably explains differences in national outlook which are somewhat difficult to reconcile.

130. The intercountry disparities are even more striking with respect to the fertility assumptions. As *table 24 shows, the Czechoslovak and Hungarian* forecasts consider it most likely that their gross reproduction rate will remain at the 1970 level, or even that it will increase (in the case of Hungary). At the same time, the Polish most probable variant assumes a rather steep decline to well below unity and the replacement level. The differences appear equally significant in other parts of Europe. On the whole, a considerable decline in current fertility is forecast, it is particularly marked in Finland, in the Federal Republic of Germany and in Switzerland, where the gross reproduction rate is expected to drop to some 0.7-0 8 by the late 1980s—very low levels by any standard By comparison, the United Kingdom assumptions appear to be on the high side [28]

131 A more comprehensive picture of expected trends in fertility, mortality and rates of natural growth is provided in table 25, which shows the trends in crude birth and death rates resulting from the assumptions of the "most likely" variant

132 Considering crude death rates first, an upward trend in many countries will be noticed. This applies particularly to such countries as Poland and the Soviet Union, with a relatively young age structure in the early *1970s; but also to other countries where the future* changes in age structure will not necessarily favour an increase in crude rates In some countries, the effect of the aging of the population is expected to be partly offset by future gains in age-specific mortality, but this is not the case in, for instance, the Federal Republic of Germany, Finland and Sweden, where, as a consequence, crude death rates are expected to rise steeply

133 As previously mentioned, crude birth rates were already very low in several European countries in the early 1970s (the Federal Republic of Germany, Finland, German Democratic Republic and Switzerland). Those in Finland are postulated to continue the downward

[28] Population projections are now prepared annually in the United Kingdom The estimates analysed in this section have since been revised downward Between 1964 and 1973, the [illegible] the Soviet Union

TABLE 25. CRUDE BIRTH AND DEATH RATES, SELECTED COUNTRIES, 1970-2000; "MOST POSSIBLE" VARIANTS

(Average annual rates per 1,000 population)

Subregion and country	*Crude birth rates*						*Crude death rates*					
	1970-1975	*1975-1980*	*1980-1985*	*1985-1990*	*1990-1995*	*1995-2000*	*1970-1975*	*1975-1980*	*1980-1985*	*1985-1990*	*1990-1995*	*1995-2000*
Eastern Europe												
Czechoslovakia	16.6	16.4	15.3	14.6	14.6	14.8	12.4	12.5	12.1	12.2	11.7	11.7
German Democratic Republic	14.2[a]	14.8	15.7	15.5	14.6	14.2	13.8[a]	13.9	13.8	13.1	11.9	11.6
Hungary	15.0	16.0	14.6	13.5	13.6	14.2	12.0	12.6	12.9	13.2	13.4	13.6
Poland	16.9	16.8	15.6	14.1	13.2	12.9	8.5	9.1	9.5	9.6	9.6	9.6
Romania	19.3	18.4	17.6	17.4	17.8	17.5	10.2	10.2	10.2	10.2	10.1	10.0
Northern Europe												
Finland	13.9	12.6	12.1	11.6	11.0	10.3	10.6	11.3	12.2	12.8	13.3	13.7
Norway	15.5	15.4	15.5	15.5	15.2	14.8	10.3	10.8	11.3	11.6	11.7	11.7
Sweden	14.3[b]	13.7	13.1	13.0	13.1	13.0	10.0[b]	11.3	11.8	12.3	12.8	12.9
United Kingdom	16.1	16.4	16.4	16.7	16.5	16.1	11.8	11.7	11.7	11.6	11.3	10.9
Western Europe												
Germany, Federal Republic of	12.0	11.5	12.1	12.8	12.3	11.3	12.2	13.0	13.6	13.9	14.0	14.0
Switzerland[c]	13.4	13.4	13.3	12.9	15.2	14.8	10.2	11.0	10.9	11.0	11.0	10.8
Southern Europe												
Spain	19.4	19.3	19.6	19.7	19.4	19.0	8.9	9.3	9.7	10.0	10.1	10.2
Yugoslavia	18.2	18.3	17.8	17.2	16.5	16.1	9.2	9.4	9.5	9.7	9.9	10.2
USSR	17.1[a]	17.6	18.1	17.5	16.3	15.6	8.2[a]	8.7	9.2	9.6	9.7	10.0

SOURCE: National projections; for Bulgaria (1990-2000), Austria, Denmark, Greece, Ireland, Italy, Portugal (1980-2000): estimates by secretariat of the Economic Commission for Europe; for Albania and German Democratic Republic: United States Department of Commerce, *Projections of the Population of the Communist Countries of Eastern Europe by Age and Sex: 1972-2000*, Series P-91, No. 22, 1972; for Soviet Union, United States Department of Commerce, *Estimates and Projections of the Population of the USSR by Age and Sex: 1950-2000*, Series P-91, No. 23, 1973.

[a] 1972-1974 average.

[b] 1972-1975 average.

[c] Swiss nationals only.

trend to reach by the end of the century what is probably the all-time record low of 10-11 per 1,000. A very steep decline (from nearly 17 to around 13) is also foreseen in Poland during the last two decades of the century. In several countries (including the Soviet Union), the impact of the post-war "baby boom" on trends in the numbers of women in the most procreative ages will tend to push up crude birth rates until about the late 1970s. The relatively high birth rates underlying the United Kingdom projections contrast with those in other countries.

134. The combination of declining birth rates and stable or increasing death rates should lead to a marked decline in the rates of natural growth in many European countries. Indeed, in the Federal Republic of Germany and Finland, this rate is expected to be negative throughout most of the projected period; and in Sweden, it should become nil towards the end of the century. In Southern Europe, rates of growth of around 10 per mille seem to be postulated, at least in the 1970s and 1980s. However, in the light of the experience of other countries, the maintenance of crude birth rates assumed in the Spanish projections is not very likely, and the gentle decline foreseen for Yugoslavia may well be too moderate in the light of data on expected family size shown in paragraphs 36-76.

Expected trends in population size by subregions

135. Projected changes in population size by subregions are shown in table 26, which should be looked upon as a continuation of table 1.[20] It will be seen that, on the basis of the most probable variants of projections, total population of Europe (excluding the Soviet Union) should increase from nearly 460 million in 1970 to some 532 million in 2000. This represents an absolute increase of 73 million over 30 years, only marginally more than the actual increment of 69 million registered over the past 20 years. The population of Western Europe is expected to increase by only 15 million by the year 2000, i.e., considerably less than over the 1950-1970 period, when it grew by nearly 27 million. For the Soviet Union, the increments are almost identical over the two periods: 64 million between 1970 and 2000; and 63 million between 1950 and 1970. Since periods of unequal length are being compared, the average annual rates are obviously declining sharply. For Europe (outside the Soviet Union), the growth rates decline from 8.1 to 4.9 per 1,000, and for the Soviet Union, from 14.8 to 7.8 per 1,000.

[20] The coverage is identical except for the exclusion of Iceland, Luxembourg and Malta.

TABLE 26 TOTAL POPULATION SIZE AND AVERAGE ANNUAL RATES OF GROWTH, BY SUBREGION, 1970-2000

("Most probable" variants of national projections)

Subregion[a]	Population size (millions)				Increment (millions)	Average annual rates of growth (per thousand)			
	1970	1980	1990	2000	1970-2000	1970-1980	1980-1990	1990-2000	1970-2000
Eastern Europe	103	109	114	119	16	5 7	4 5	4 3	4 8
Northern Europe	80	83	87	91	11	3 7	4 7	4.5	4.3
Western Europe	148	153	159	163	15	3 3	3 8	2.5	3.2
Southern Europe	128	138	149	159	31	7 5	7.7	6 5	7.2
Total Europe (excluding USSR)	459	483	509	532	73	5 1	5 2	4 4	4 9
USSR	242	265	288	306	64	9 1	8 3	6 1	7.8

SOURCE. National projections, for Bulgaria (1990-2000), Austria, Denmark, Greece, Ireland, Italy, Portugal (1980-2000)· estimates by secretariat of Economic Commission for Europe, for Albania and German Democratic Republic United States Department of Commerce, *Projections of the Population of the Communist Countries of Eastern Eurobe by Age and Sex 1972-2000*, Series P-91, No 22, 1972, for Soviet Union United States Department of Commerce, *Estimates and Projections of the Population of the USSR by Age and Sex 1950-2000*, Series P-91, No 23, 1973

[a] Subregions include the following countries:
Eastern Europe Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.
Northern Europe Denmark, Finland, Ireland, Norway, Sweden, United Kingdom
Western Europe Austria, Belgium, France, Federal Republic of Germany, Netherlands, Switzerland
Southern Europe Albania, Greece, Italy, Portugal, Spain, Yugoslavia

136. For the projected period, the rates are highest in Southern Europe (7.2 per 1,000) and lowest in Western Europe (3 2 per 1,000) For reasons already mentioned, a slight increase in growth rates is forecast in the 1980s in all regions except Eastern Europe, to be followed by a marked decline in the 1990s, particularly in Western and Southern Europe. It should be borne in mind that the projected regional rates cannot be meaningfully compared with the 1950-1970 trends, since the latter were heavily influenced by interregional migration

Expected changes in age structure

137 The past and the expected downward trends in fertility are normally reflected in a reduction in the proportion of young people in the population and in an increase in the proportion of the elderly. Table 27 shows that a decline in the percentage of persons below the age of 15 can indeed be expected everywhere, particularly in Eastern and Western Europe, where it will drop by about 3.5 and 3 per cent, respectively, over the period 1970-2000. However, trends in the proportion of persons aged 60 or more are not uniformly upward, apart from Southern Europe and the Soviet Union. The reason is that the 1970s will witness the entry into the 60-65 age bracket of the diminished birth cohorts of the First World War, as well as of the age groups depleted during the Second World War. The true extent of the aging of population is better shown by considering changes in the proportion of persons above the age of 75 during the period 1970-1990 (after that date, the dent will have reached the 75-plus age group). Thus, by 1990 the share of *grands vieillards* will exceed 5 per cent for Europe as a whole, more than double the 1950 figure.

138. In contrast to the past trends, the dependency ratios will tend to improve somewhat during the next 10-20 years, as shown in the last column of table 27.[30] They will remain about stable or slightly deteriorate in the following decades, but (apart from Southern Europe) they are not likely to revert to the 1970 level. In relative terms, the dependency burden, which was markedly heavier in Northern and Western Europe than in other areas around 1970, will tend to be much more uniform between subregions by the end of the century.

SUMMARY OF CONCLUSIONS

139. The population of Europe (outside the Soviet Union) increased by nearly 70 million persons between 1950 and 1970. This represented an average annual rate of growth of around 8 per 1,000—a figure much below those recorded in other regions of the world. The rates of natural increase were only marginally higher, and declined from nearly 9 per 1,000 in the 1950s to around 7 per 1,000 in the late 1960s A particularly steep fall was experienced by Eastern Europe (as well as by the Soviet Union), and the gap in the rates of growth between European subregions narrowed.

140 The urban population of Europe was growing at a rate twice that of its total population, and by 1970 the north and west European countries had more than 70 per cent, and the eastern and southern more than 50 per cent of the population resident in areas defined as urban.

141. Further gains were registered in the average length of life everywhere However, improvements in mortality were relatively greater among the less advanced countries and the expectation of life at birth

[30] In the Union of Soviet Socialist Republics, the [illegible] decline in the proportion of the young to 5 per cent between 1970 and 1980, will significantly raise the share of the working-age population, and correspondingly [illegible] burden during the 1970s

TABLE 27. CHANGES IN THE AGE STRUCTURE OF THE POPULATION BY SUBREGION, 1970-2000

("Most probable" variants of national projections)

Subregion *	Year	Percentage of total population: –15 age group	15-59 age group	60+ age group	75+ age group	Number of persons below the age 15 and above age 60 per 1,000
Eastern Europe	1970	24.6	59.8	15.6	3.2	674
	1980	23.0	61.8	15.2	4.1	617
	1990	22.2	61.0	16.7	4.7	639
	2000	21.0	60.8	18.2	4.7	645
Northern Europe	1970	24.1	57.6	18.3	4.4	737
	1980	23.2	57.9	18.9	5.2	727
	1990	23.1	58.3	18.6	5.7	715
	2000	23.0	59.7	17.3	5.6	674
Western Europe	1970	24.2	57.5	18.3	4.4	740
	1980	22.0	60.5	17.5	5.4	653
	1990	21.5	60.5	18.0	5.7	653
	2000	21.4	59.7	18.9	5.4	675
Southern Europe	1970	26.4	59.2	14.4	3.3	689
	1980	25.1	60.1	14.7	3.8	663
	1990	24.7	59.2	16.1	4.3	690
	2000	24.7	58.6	16.7	4.3	705
Total Europe (excluding USSR)	1970	24.9	58.5	16.6	3.8	710
	1980	23.3	60.3	16.4	4.6	660
	1990	22.9	59.9	17.3	5.1	671
	2000	22.6	59.6	17.8	4.9	677
USSR	1970	28.9	59.3	11.8	2.4	687
	1980	23.9	63.0	13.1	3.4	588
	1990	24.3	60.3	15.4	4.4	659
	2000	23.0	59.0	18.0	4.5	695

SOURCES: National projections; for Bulgaria (1990-2000), Austria, Denmark, Greece, Ireland, Italy, Portugal (1980-2000): estimates by Economic Commission for Europe secretariat; for Albania and German Democratic Republic: United States Department of Commerce, *Projections of the Population of the Communist Countries of Eastern Europe by Age and Sex: 1972-2000*, Series P-91, No. 22, 1972; for USSR, United States Department of Commerce, *Estimates and Projections of the Population of the USSR by Age and Sex: 1950-2000*, Series P-91, No. 23, 1973.

* Subregions include the following countries:

Eastern Europe: Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Poland, Romania.

Northern Europe: Denmark, Finland, Ireland, Norway, Sweden, United Kingdom.

Western Europe: Austria, Belgium, France, Federal Republic of Germany, Netherlands, Switzerland.

Southern Europe: Albania, Greece, Italy, Portugal, Spain, Yugoslavia.

tended to converge in the various parts of Europe. By the early 1970s, infant mortality seems to have almost reached its lowest possible point in the more advanced countries, whereas death rates at older ages stabilized or even increased, particularly among men. Progress was everywhere faster among women than among men, and the sex mortality differential tended to widen, especially among the wealthier countries.

142. Because of the continuous aging of populations (manifested in the increasing proportions of persons in the older age groups), improvements in the age specific mortality rates were not fully reflected in the trends in crude death rates. These remained about constant in Northern and Western Europe and declined little in other parts. In the late 1960s, crude death rates tended to increase slightly in Eastern Europe and the Soviet Union.

143. After the almost general post-war "baby boom", trends in fertility varied greatly between European countries. Among the countries of Eastern Europe, the post-war peaks in crude birth rates were reached in the early 1950s, when a spectacular decline set in which came to a halt in most countries of the area in the late 1960s. In some western and northern countries, birth rates actually rose in the late 1950s or early 1960s. However, they dropped everywhere after 1964, and by the early 1970s they reached record low levels in most countries.

144. It has been shown that during most of the period under study the proportions of married women tended to increase everywhere, due mostly to a general lowering of the age at marriage and, in some countries, to the normalization of the sex ratios at marriageable ages. Thus, the nuptiality factor tended to push up the

levels of natality, particularly during the earlier years of the period under study. However, this influence was largely offset by the unfavourable changes in age structure of the female population. During the late 1960s and early 1970s, the arrival into reproductive age of large post-war birth cohorts contributed to an increase in the annual number of births in many countries.

145 A feature of recent developments in Europe is the predominating desire for families of one or two children and the expected disappearance of families with four or more children among more recent marriages. There is also some evidence that shrinking family size has been accompanied by a tendency among couples to have their children earlier in life and at shorter intervals. The results of special sample inquiries undertaken in a dozen European countries indicate that the recently married couples expect to have much smaller familes than those married 10, 15 or more years ago, the current average oscillating around 2 0 children If realized, these desires would result in a decline in the absolute size of the populations concerned. Indeed, already by the early 1970s, several European countries had a zero or near zero natural rate of population growth, and net reproduction rates below unity.

146. Apart from the post-war resettlements and some politically motivated population transfers, Europe was also the scene of important migratory movements of labour—as a rule from the south to the north By the early 1970s, the number of migrants was estimated at about 7 million persons, settled mainly in the Federal Republic of Germany, France, Sweden and Switzerland, and originating mainly in Italy, Portugal, Spain, Turkey and Yugoslavia. Given that in many countries the traditional reserves of labour have been exhausted, that the employment of women is already well advanced and that the labour supply is shrinking for demographic reasons, it is to be expected that the demand for labour will continue to exceed the supply in the more developed European regions, providing scope for further labour transfers. It is extremely difficult, however, to estimate future numbers of migrants and most nationally prepared population projections either ignore or pay "lip service" to this component of population growth.

147. With the uncertainties concerning future migration, imprecise knowledge of factors behind the recent fertility decline and little understanding of the recent changes in the sex and age patterns of mortality, population projections in Europe have become even more hazardous than before. This is demonstrated in a wide range of assumptions adopted by the various European countries in their "most probable" or medium variants of projections covering the period 1970-2000. For Europe as a whole (excluding the Soviet Union), it is expected that the average annual rate of growth will fall to around 0 5 per cent, but for several countries, zero or even negative rates of natural growth are considered most likely by the authors of the national projections. All in all, the population of Europe should rise from about 460 million in 1970 to some 532 million in the year 2000, or 4.9 per 1,000 per year, compared with an average rate of 8.1 per 1,000 during the preceding 20 years For Europe including of the Soviet Union, the absolute increase would be from 703 million to 838 million and the corresponding annual rates, 5 8 and 10 4

WORLD AND REGIONAL LABOUR FORCE PROSPECTS TO THE YEAR 2000

International Labour Office

1. Information about the future size and structure of population and of labour force is essential for the preparation, implementation and assessment of social and economic development plans. Viewed from a consumption/production perspective, the projections of total population (consumers) provide a basis for estimating future needs and requirements for various goods and services such as food, clothing, housing, transport, education, health and other services; and the projections of labour force (producers) provide a basis for determining the supply of labour available for providing such goods and services. The labour force projections also serve as a means of measuring the needs for employment creation and as such are necessary prerequisites of the formulation of employment policies and plans.[1]

2. The contrasting of data on population and labour force by sex and age group provides information on the relative size, composition and growth of the active and non-active population, and on dependency levels and patterns.

3. Alternate series of labour force projections based on alternate series of population projections provide useful information concerning the impact of assumed population changes on the future size and structure of the labour force and are therefore useful for the setting of long-range targets and goals.

4. The possibility of changing the course of events that is implicit in the projections of population and labour force, as concerns both size and sex-age composition, hinges on the scope for influencing the underlying basic determinants. The labour force in a given area is determined by:

(*a*) The size and sex-age composition of the total population in the area;

(*b*) The labour force participation rates for each of the sex-age groups of that population.

5. The size and sex-age composition of the total population in a given area changes over time as a consequence of changes in births, deaths and migration in and out of the area. Each of these demographic variables has its particular effect on the size and sex-age composition of the population; each reflects the combination of economic, social and cultural factors peculiar to the area; and each may be changed both in degree and in space of time through appropriate population programmes and policies. The labour force participation rates of a population in a given area are largely determined by the economic, social and cultural factors peculiar to the area, but these rates are not static—they each change over time in varying degree and so does the net effect of their interaction.

6. This paper examines in some detail labour force projections for the world and its major areas and regions during the period from 1970 to the year 2000. These projections have been derived by combining the estimates and projections of total population according to the low, medium and high variants of projected growth prepared by the United Nations Population Division with the estimates and projections of labour force participation rates prepared by the International Labour Office.[2] The labour force projections thus obtained serve to illustrate how the demographic evolution affects the size and the structure of the labour force and they provide measures of projected net changes in the world labour force, in particular, in its total size and its distribution by sex and age group.

7. These projections are the result of calculations based on various combinations of assumptions as to future trends in the basic determinants of the labour force; they are neither forecasts nor prophecies, but it is hoped that they will provide information on the relative amelioration or degradation of existing relationships and serve as warning signals for action to be taken towards the solution or amelioration of the

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[1] The labour force, as the term is used in this paper, refers to the economically active population and comprises all persons who contribute to the supply of labour for the production of economic goods and services, including not only those employed—regardless of the intensity of employment—but those unemployed. Members of the armed forces are considered part of the labour force.

Persons who do not participate in some way or other in the productive effort of the community either as employers, wage earners or salaried employees, own-account workers, unpaid family workers or members of producers' co-operatives are regarded as belonging to the inactive or dependent population. The inactive population includes women engaged in home domestic activities, young children below school age, persons living on private income and the retired. It also includes the enrolled school population, institutionalized persons, the incapacitated and all persons not intending to work or not available for work.

The projections of the labour force may therefore be viewed as a fair measure or estimate of the number of persons who will be exerting, in one way or another, some pressure on the labour market whether fully or partially employed or underemployed, or unemployed and looking or intending to look for employment.

[2] For further information on the population and labour force projections, their scope and coverage, and the assumptions on which they are based, see paras. 68-72.

particular economic and social problems which may be anticipated.

LABOUR FORCE TRENDS AND PROSPECTS

An overview

8 In the middle of the eighteenth century, the world's total labour force numbered about 360 million persons, approximately equal to the total population of Africa today. In the ensuing one-and-a-half centuries, it increased by about 350 million persons and again by about 360 million in the next 50 years, so that by 1950, the world's labour force numbered about 1,070 million

9 The time required for increases of approximately equivalent amounts has now shortened dramatically. From 1950 to 1980, the world's labour force is expected to increase by about 710 million persons, or as much as in the preceding 200 years; while in the remaining two decades of this century, based on the medium variant of population growth, about 750 million persons would be added (685 million according to the low variant and 800 million according to the high variant).

10 During the 1990s alone, the increase in labour force is expected to surpass 360 million for the low variant, 410 million for the medium variant and 450 million for the high variant This accelerating growth of labour force is expected to continue well into the next century, reaching a maximum of about 490 million (medium variant) during the decade 2010-2020 and averaging about 450 million per decade during the 50-year period 1990-2040. The growth is then expected to subside to the magnitudes experienced in years prior to 1950

11. Thus, while the world is currently traversing a period of unprecedented rates of growth of total population and, since labour force growth is determined primarily by population growth—subject to a time lag of up to 20 years—the world is also at the threshold of an explosive growth in the labour force.

12. The 50-year period 1970-2020 will unveil fundamental transformations of the world's labour force, its composition by sex and age, and its regional distribution. This paper therefore examines in some detail labour force projections for the world and its major areas and regions during the period 1970-2000, a 30-year period for which it has been possible to assemble reasonably valid and comprehensive data (both estimates and projections) of the world's total population and total labour force by sex and age group and for the geographical areas under consideration.

Nature of the projections

13. The size and sex-age composition of the labour force is determined by the size and sex-age composition of total population and by the extent to which men and women of various ages participated in labour force activities. The latter may be expressed as sex-age specific labour force participation rates Thus, in sum, the validity or plausibility of the labour force projections depends upon the correctness of:

(*a*) The population estimates for base date and the population projections, the latter being conditioned by the assumptions made as concerns fertility, mortality and migration;

(*b*) The labour force estimates for the base date and the projections of labour force participation rates, the latter being conditioned by the assumptions made as concerns the future effects of economic and social development on the propensities of males and females to enter and to leave the labour force at particular ages

The demographic factors

14 The population estimates (world, major areas and regions) used in this paper are relatively accurate and represent the best set of statistics currently available (see the note on the data in paras 68-72)

15 Changes in population due to variations in fertility during the period from 1970 to 1985 (reflecting the assumptions in the low, medium and high variants of total population projections) are expected to have very little effect on the labour force projections up to the latter year, since all the population of working age in 1985 have already been born However, as concerns projections for the year 2000, these changes could have a significant effect since they will have a direct influence on the number of persons who will be aged 15-29 in the year 2000. This age group represents as much as 37 per cent of the world's labour force today; by 2000 its relative importance may decline to between 34 per cent (low variant) and 36 per cent (high variant) Fertility trends will also have an effect on the participation of women in the labour force during the whole of the projection period, but this factor is implicitly taken account of in the projection of female labour force participation rates.

16 Any change in mortality trends from 1970 onward will affect the labour force growth The future mortality trends reflected in the low, medium and high variants of projected population growth are deemed plausible, in the absence of unforeseeable catastrophic events.

17. At the world level, the influence of migration may be disregarded. However, the population projections presented here do not take account of international migration between the major areas or regions although it could have a significant impact on the accuracy of the population and labour force projections for certain regions.

The labour force factors

18. Taking the base date population estimates as given, the labour force estimates for the base date are the direct result of applying the labour force participation rate estimates for that date. These rates have been derived primarily from census data.

. The projected patterns of change in labour activity rates have been derived primarily from rical analogy based on comparative analyses.

. Assuming that the population projections are nably accurate, and granted that historical evi- proves that the major determinants of changes e size of the labour force are demographic (see . 21-24), then barring any unprecedented changes e social and economic life affecting a large part e population which could seriously detract from uture trends in labour force participation rates ned for the labour force projections, the results nted in this paper for the world at large and its geographical areas may be viewed as reasonably ible projections for the period from 1970 to the 2000. It should be borne in mind that the extent ich effective action will be taken to influence, in ding order of importance, the future course of ty, mortality, migration and labour force parti- ion cannot be predicted, and the projected future ges in labour force may be off target on this nt.

ive importance of demographic and other factors as determinants of labour force changes

. The world's labour force during the period 1960 to 1970 increased by some 230 million ns. If the labour force participation rates by sex age had remained constant at the 1960 level ghout this 10-year period, the changes in the size tal population and in its sex-age structure during decade would have increased the world's labour by about 291 million persons. However, the net ase in the labour force was some 61 million less use changes in labour force participation rates were ced by socio-economic and cultural factors. These ges are summarized in table 1.

E 1. EFFECT OF DEMOGRAPHIC CHANGES AND OTHER CTORS ON THE GROWTH OF THE WORLD'S LABOUR FORCE, 60-1970

(Millions)

	Due to demographic changes	*Due to other factors*	*Estimated actual increase*
d			
th sexes	*291*	*—61*	*230*
ales	200	—38	162
males	91	—23	68
developed regions			
th sexes	*56*	*—10*	*46*
ales	37	—11	26
males	19	1	20
developed regions			
th sexes	*235*	*—51*	*184*
ales	163	—27	136
males	72	—24	48

URCE: International Labour Office, Statistical Branch.

22. Thus during the 1960s the demographic factors played a particularly important role in the net changes to the world's labour force. The demographic factors were particularly important for males, particularly in the less developed regions. The result of similar calculations for the period 1970-2000 based on the projections for the year 2000 are shown in table 2.

TABLE 2. EFFECT OF DEMOGRAPHIC CHANGES AND OTHER FACTORS ON THE PROJECTED GROWTH OF THE WORLD'S LABOUR FORCE, 1970-2000

(Millions)

	Due to demographic changes	*Due to other factors*	*Net increase*
(Medium variant)			
World			
Both sexes	*1,293*	*—271*	*1,022*
Males	872	—177	695
Females	421	— 94	327
More developed regions			
Both sexes	*156*	*— 14*	*142*
Males	107	— 26	81
Females	49	12	61
Less developed regions			
Both sexes	*1,137*	*—257*	*880*
Males	765	—151	614
Females	372	—106	266
(Low variant)			
World	*1,206*	*—251*	*955*
More developed regions	141	— 8	133
Less developed regions	1,065	—243	822
(High variant)			
World	*1,364*	*—289*	*1,075*
More developed regions	170	— 17	153
Less developed regions	1,194	—272	922

SOURCE: International Labour Office, Statistical Branch.

23. Although over the 30-year period the projected changes in activity rates by sex and age are substantial, it is clear that the future development of the world's labour force will still be determined primarily by the evolution of the population and its sex-age structure. To a very large extent, the future changes in the population up to the year 2000 have already been set in motion along what appears to be a fairly unalterable course, particularly as drastic changes in mortality levels and interregional migration flows may be considered as highly improbable.

24. The magnitude of the projected changes shown in table 2 indicates, for the rest of this century, a veritable labour force explosion which is likely to aggravate further the already serious problems of unemployment and underemployment. In any event, fundamental transformations of the world's labour force, its composition by sex and age and its geographical distribution are in course.

The labour force and its major characteristics, 1970-2000

Total growth of labour force

25. As table 4 (see annex) indicates, the world's labour force in 1970 numbered approximately 1.5 thousand million persons It is expected, according to the medium variant of population growth (see table 5 in annex) to increase by over 270 million during this decade, about 335 million in the 1980s and over 410 million during the last decade of this century—a total increase of about 1,020 million for the 30-year period. The projected 30-year increases, according to the low and high variants, would amount to 955 million and 1,075 million, respectively

26. For the more developed regions, the net increase in labour force is expected to decline from about 5.7 million per annum in the present decade to about 4 million per annum in the decade 1990-2000 representing a total increase according to the medium variant of about 142 million for the 30-year period (133 million for the low variant and 153 million for the high) In the less developed regions, the growth will not only be considerably greater, but will be accelerating as well About 22 million people will be added to the labour force each year during the present decade, 29 million each year during the 1980s and over 37 million each year during the 1990s—giving a total increase, according to the medium variant, of about 880 million over the 30-year period (about 820 million for the low variant and 920 million for the high)

27 Thus, the world's labour force is expected to increase by from 63 to 71 per cent during the 30-year period from 1970 to 2000 (68 per cent for the medium variant) The increases in the more developed regions are expected to amount to between 27 and 31 per cent (29 per cent for the medium variant), and in the less developed regions to between 81 and 90 per cent (86 per cent for the medium)

28. Marked differences may be expected in the growth of labour force in the various regions of the world In Latin America, the labour force is expected to increase by about 120 per cent. Other regions where the labour force is expected to at least double are Africa (110 per cent increase), South Asia (100 per cent increase), and Oceania, excluding Australia and New Zealand (about 100 per cent increase) Relatively moderate increases are expected in such areas as Europe (20 per cent), Japan (23 per cent) and the Union of Soviet Socialist Republics (30 per cent). For Australia and New Zealand, the projected increases are in the neighbourhood of 75 per cent, for Northern America, about 50 per cent. However, in view of the great difference in relative size of the labour forces of these respective areas, the numbers involved are worth noting In South Asia alone, the net increase in the present decade (almost 100 million) is expected to be almost twice that for all the more developed regions combined, three times as much in the decade 1980-1990 and almost five times greater in the period 1990-2000

29. In the 30-year period, the labour force is expected to increase in South Asia by about 425 million persons, in East Asia by about 220 million, in Africa by about 145 million and in Latin America by about 105 million For Europe, the USSR and Northern America, the 30-year increases are expected to amount to about 40 million in each case.

Relative rates of growth

30 The annual average rates of growth of the world's labour force and its major areas and regions according to the low, medium and high variant projections are shown in table 6 (see annex); rates of growth are also shown for the projected total population (see table 7 in annex) It is clear from these data that the levels of the respective rates of growth of the total labour force and the total population are usually not the same for the corresponding time period. In addition, the direction of the changes in the two types of rates of growth over particular time periods during the 30-year projection also differs frequently. For example, during the 1970s, the world's labour force is expected to increase at a rate of 1 7 per cent per annum, increasing to 1 8 per cent per annum during the 1980s and continuing at that level for the last decade of the present century. On the other hand, the total population growth rate for the present decade and for the 1980s, according to the same variant (medium), is 2.0 per cent per annum, decreasing to 1 8 per cent for the last decade of the century.

31 In the more developed regions in general, but particularly in Europe and Northern America, the rate of growth of the population is less than that of the labour force; the reverse is the case for the less developed regions This is mainly explained by differences in demographic structure, the less developed regions having a much larger proportion of their population in the very young (non-working) age groups at the beginning of the period considered In effect, these regions had relatively higher rates of growth of total population for the period 1950 to 1980 and therefore expect to have relatively higher labour force growth rates for the period 1970 to 2000.

32. For purposes of planning and action-oriented programmes, two clear inferences may be drawn from these data. First, rate of growth of total population should not be used as a substitute for labour force growth rates in economic models (which has often been the case); and secondly, the current rates of growth of total population may serve as an indicator or harbinger of things to come two or three decades later as concerns growth of the labour force.

Labour force participation rates

33. There are sharp contrasts between the labour force participation rates of the less developed regions

and the more developed regions. In each age group, the labour force participation rates for males in 1970 were higher in the less developed regions than in the more developed regions. The differences were particularly striking for youth and persons aged 55 and over. Despite these higher participation rates for the individual age groups, the crude activity rate (activity rate of the population of all ages) was lower in the less developed regions (53.7 per cent) than that of the more developed regions (57.3 per cent) (see table 8 in annex). This apparent anomaly is explained by the unfavourable age structure of the less developed regions which contain a higher proportion of population among the non-active (see figure given below).

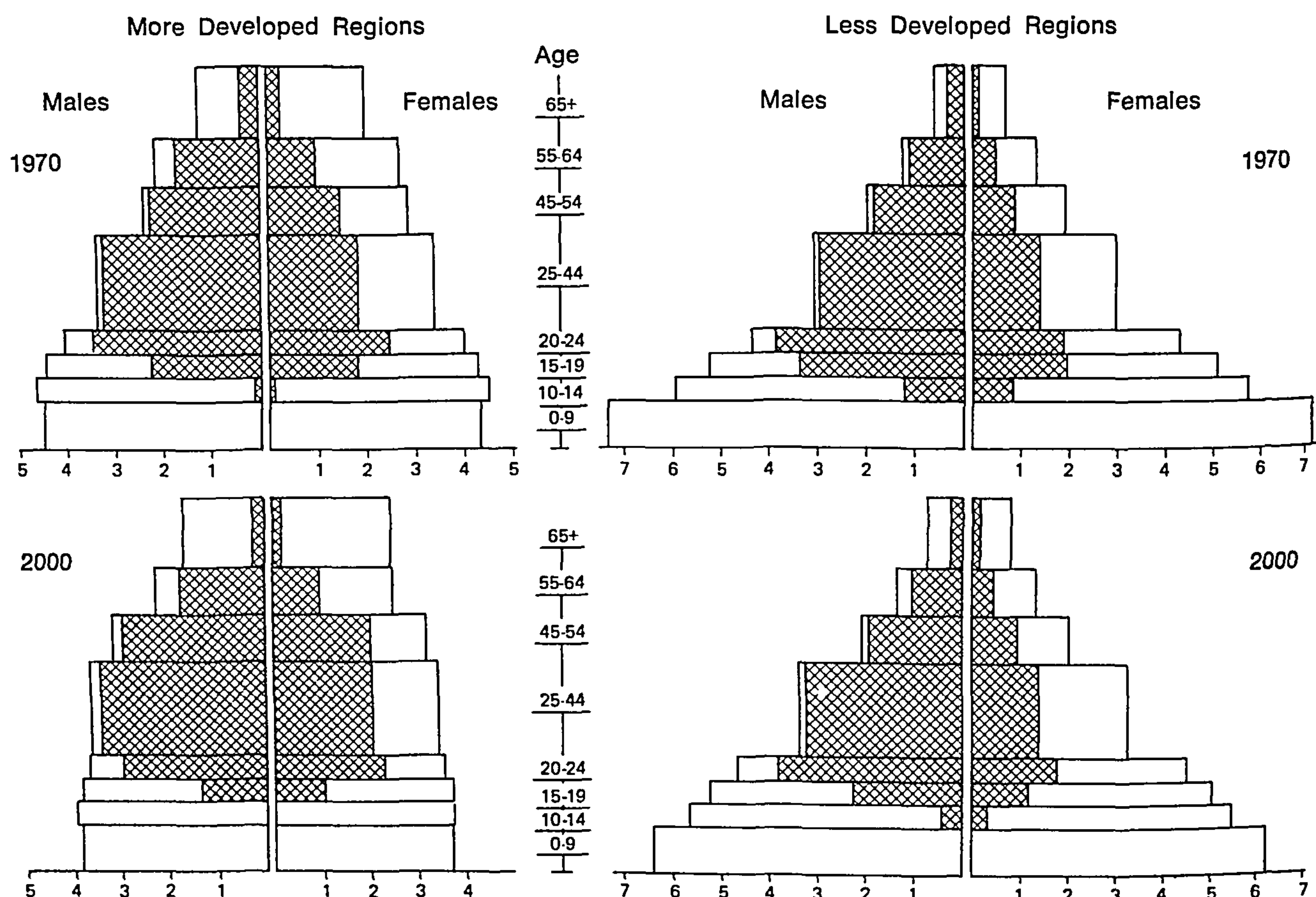
34. The crude activity rate for female population in the more developed regions is likewise higher (33.2 per cent) than that in the less developed regions (26.4 per cent), again not only because of more favourable age structure, but because of generally higher participation rates in the more developed regions except in the cases of the very young (aged 10-14) and those aged 65 and over (see table 8 in annex).

35. The labour force participation rate projections 1970-2000 (also shown in table 8) show male rates decreasing for all age groups and in all geographical areas. These decreases reflect, *inter alia*, assumptions of continued progress in the fields of education, training, social security and retirement schemes, and in general, over-all social and economic development.

36. The female activity rates in the more developed regions are expected to increase for age groups 20-64 years, but to decrease for those under 20 and those over 64 years of age. The projected changes in activity rates, combined with expected changes in population age structure (medium variant), would raise the crude activity rate for females to about 35 per cent. Thus, the female labour force in the more developed regions may be expected to rise by about 61 million in the 30-year period, a growth of 33 per cent, whereas the male labour force may rise by 81 million or 27 per cent.

37. In the less developed regions, female labour force participation rates are expected to decline for all age groups throughout the period 1970-2000. Combined with changes in the age structure of the population, the crude activity rate of females is expected to decline from the 1970 level of 26 per cent to about 24 per cent. Nevertheless, the female labour force in the less developed regions may increase by about 266 million, a growth of 81 per cent by the end of the century compared with 89 per cent projected for males (medium variant in each case).

Population and labour force by sex and age, 1970 and 2000



Age structure of the labour force

38 As is clear from the age pyramids shown in the figure, there are striking differences between the more and less developed regions as concerns the proportions of total population and of total labour force, respectively, in the corresponding age group The more developed regions have a far smaller percentage of population under 25 years of age (43 per cent as compared with 59 per cent), proportionally more aged 25-54 (37 per cent *versus* 32 per cent) and in the age group 55 and over, have more than twice the proportion than in the less developed regions (19 per cent *versus* 9 per cent) The strikingly different age distributions of population have their counterpart in the size of labour force in relation to the total population and, therefore, in the dependency burden that the working population has to support The age structure of the more developed regions is obviously more favourable in this respect

39. The situation in 1970 and the projected development during the remaining years of this century as concerns young workers, those of prime working age and older workers are discussed in some detail below.

Young workers

40 Of the approximately 439 million young persons who were in the world's labour force in 1970, about 329 million, or three out of four, were in the less developed regions, where they constituted about 32 per cent of the total labour force. On the other hand, the 110 million young workers in the more developed regions constituted only 23 per cent of the total labour force.

41. Between 1970 and 2000, based on the medium variant, the number of young workers is expected to increase in the less developed regions by about 155 million or 48 per cent and to decrease in the more developed regions by some 5 5 million, equal to a decline of 5 per cent In both cases, their share of the total labour force should fall to around 26 and 17 per cent, respectively (see table 9 in annex).

42. Projections for the period 1970-2000 based on the low and high variants of population growth indicate *increases of 126 million and 185 million, respectively,* in the less developed regions, and, in the more developed regions, a decrease of 13 million and an increase of 3 million, respectively. Thus, the share of young workers in the total labour force in each major area would be one percentage point higher with the high variant, or one percentage point lower with the low variant

43. These changes are expected to occur mainly as a consequence of the projected significant decline in labour force participation rates for young persons on the assumption of increases in the numbers undergoing full-time education For example, in the more developed regions, the activity rates for young males aged 10-14, 15-19 and 20-24 are expected to decrease from 2.4, 50 4 and 85 9 per cent, respectively, in 1970 to 0.5, 34 0 and 79.8 per cent in the year 2000 Similarly, in the less developed regions, the corresponding activity rates may decrease from 20 2, 64 0 and 88.2 per cent in 1970 to 7 2, 43.2 and 81.7 per cent by the year 2000. Decreases in activity rates of young females in these age groups are also expected, with the exception only of those aged 20-24 in the more developed regions where the activity rate is expected to increase (from 61 1 per cent in 1970 to 64.9 per cent in the year 2000). These projected declines in activity rates make a considerable difference, as concerns the total number of young persons expected to be in the world's labour force in the year 2000 if the result is compared with the figures obtained by applying 1970 activity rates; thus, for the medium variant, 593 million instead of 783 million Corresponding figures for the low variant are 552 million (727 million) and for the high variant 627 million (833 million)

44 Since the range of the estimates (high variant minus low variant) is 75 million as concerns the projected total increase in the number of young workers from 1970 to 2000, this represents 3 per cent of the *total labour force of all ages (2,528 million) projected* under the medium variant The projected decreases in activity rates between 1970-2000 have a still more important effect as mentioned above Depending upon which fertility variant is used, there is a difference of from 175 million (low variant) to 206 million (high variant) between the projected number of young workers obtained by applying 1970 rates. These differences represent from 7-8 per cent of the total labour force.

45. The patterns of change for young workers will differ from region to region During the period from 1970 to 2000, according to the medium variant, the number of young persons in the labour force is expected to increase in South Asia (from 142 million to 237 million), Africa (from 46 million to 88 million), Latin America (from 29 million to 52 million), the USSR (from 27 million to 29 million) and Oceania (from 2.5 million to 3 6 million) Young workers are expected to decline in number in East Asia (from 127 million to 125 million) and Europe (from 46 million to 40 million) and to remain almost constant at about 19 million in Northern America

46 Thus, the less developed regions are expected to account for over 82 per cent of the world's young workers in the year 2000 as compared with almost 77 per cent in 1970

47 The Asian region alone is expected to account for 61 per cent of the world's young workers in the year 2000 (61 per cent in 1970), Africa almost 15 per cent (10 5 per cent in 1970), Latin America 8 7 per cent (6 6 per cent in 1970). The share of Europe is expected to fall to 6 8 per cent (10 5 per cent in 1970), that of the USSR to 4 8 per cent (6.1 per cent in 1970) and Northern America to 3.2 per cent (4.4 [illegible] cent in 1970), while the share of [illegible] is [illegible] to remain at about 0 6 per cent.

Older workers

48. There were about 190 million persons aged 55 and over in the world's labour force in 1970, representing 13 per cent of the labour force of all ages. The corresponding figures were 77 million (16 per cent) for the more developed regions and 114 million (11 per cent) in the less developed regions. By the year 2000, the number of older workers in the world is expected to increase to about 288 million. Alternative projections based on the low and high variants of population yield figures very close to the foregoing, namely, 284 million and 291 million (see table 9 in annex).

49. The expansion of the world's labour force is expected to be such that the older workers' share would, nevertheless, decline to about 14.5 per cent in the more developed regions and 10.5 per cent in the less developed regions by the year 2000.

50. While the number of persons aged 55 and over in the labour force is expected to increase moderately in the more developed regions (by about 13.5 million, or 17.5 per cent) during the period 1970-2000, in the less developed regions the absolute increase will be six times greater (by about 83 million) and the proportionate increase four times greater (73 per cent).

51. With the number of older workers expanding faster in the less developed regions, their share of the world's workers aged 55 and over is expected to increase from about 60 per cent in 1970 to 69 per cent by the year 2000. The Asian region alone is expected to account for 58 per cent (52 per cent in 1970), Africa almost 10 per cent (7 per cent in 1970) and Latin America about 6 per cent (5 per cent in 1970). Among the more developed regions, the share of Europe may fall to below 13 per cent (compared with 18 per cent in 1970), that of the USSR to 7 per cent (9 per cent) and of Northern America to 6 per cent (8 per cent), while that of Oceania is expected to remain at about 0.5 per cent.

Labour force of prime working age

52. The world's labour force of prime working age (25-54 years) is expected to increase by 770 million or 88 per cent, during the period 1970-2000. The less developed regions accounted for almost two thirds of the world labour force of prime working age in 1970; by the end of this century, these regions may account for almost three fourths (see table 9 in annex).

53. According to the medium variant projections, in the more developed regions the labour force of prime working age would increase by about 45 per cent (134 million) compared with 110 per cent (637 million) in the less developed regions. The low and high variant projections indicate increases of 133 million and 137 million, respectively, for the more developed regions and 617 million and 650 million, respectively, for the less developed regions.

54. The 30-year increase in the size of this group is estimated (medium variant) at about 150 per cent for Latin America (74 million), 122 per cent for Africa (91 million), 120 per cent for South Asia (290 million), 100 per cent for Oceania (4.6 million), 77 per cent for East Asia (196 million), 72 per cent for Northern America (40 million), 41 per cent for the USSR (32 million) and 36 per cent for Europe (44 million). Thus, by the year 2000, the labour force of prime working age in the Asian region may constitute 60 per cent of the world total (56 per cent in 1970); that of Africa, 10 per cent (8 per cent in 1970); Europe, 10 per cent (14 per cent in 1970); and Northern America, 5.8 per cent (6.3 per cent in 1970).

55. In each region of the world, the labour force of prime working age will become a higher proportion of the total labour force. In the more developed regions, the proportion is expected to expand from 62 per cent in 1970 to 69 per cent in the year 2000 (68.2 per cent for the high variant and 69.7 per cent for the low variant). In the less developed regions, the expansion will be from 57 to 64 per cent (63.2 per cent for the high variant and 64.8 per cent for the low variant). Thus, the effect of using alternative (high or low) variants of total population growth is almost insignificant.

Women in the labour force

Size and geographical distribution of the female labour force

56. In 1970, the world's female labour force numbered about 515 million persons. It is expected to number 600 million by the end of the present decade, 700 million by 1990 and about 842 million by the year 2000. Alternate variants would yield projected figures of 817 million (low variant) and 862 million (high variant).

57. The size of the world's female labour force is expected to show an increase of approximately two thirds during the 30-year period 1970-2000, but in the more developed regions, a growth of between 31 and 35 per cent, and in the less developed regions, some 75 to 85 per cent, depending upon the variant used for the projections. Thus, whereas in the less developed regions the female labour force in 1970 numbered about 329 million, or 64 per cent of the world total, by the year 2000 it is expected to number between 575 million and 610 million or over 70 per cent of the world total. In effect, by the year 2000, the female labour force in the less developed regions is expected to exceed significantly the current world total (see table 9 in annex).

58. The female labour force in the year 2000 is expected to number some 500 million in the Asian region alone (293 million in 1970); in Africa, 85 million (42 million in 1970); and in Latin America, 38 million (17 million in 1970). The growth in the 30-year period in the more developed regions is expected to be moderate: in Europe, from 69 million to 88 million; in the USSR, from 61 million to 75 million; in Northern

America, from 31 million to 50 million; and in Oceania, from 2 million to 5 million

59 The share of the world's female labour force in the three developing regions is expected to increase as follows. to 60 per cent for Asia (57 per cent in 1970); 10 per cent for Africa (8 per cent in 1970); and 4 5 per cent for Latin America (3 per cent in 1970) The proportion in Europe will decrease from 13 per cent in 1970 to 10 per cent in the year 2000 and the USSR share will decline from 12 per cent to 9 per cent, while Northern America and Oceania will continue to have about the same shares, namely, 6 per cent and 0.5 per cent, respectively.

Relative importance of women workers

60 In 1970, 34 per cent of the world's labour force were females For the more developed regions, the figure was 38 per cent compared with 32 per cent for the less developed regions Despite the projected changes in male and female activity rates described above and the projected changes in sex-age structure of the total population, these proportions are expected to remain at about the same levels, for the year 2000, they are expected to be around 39 per cent in the more developed regions and 31 per cent in the less developed regions (see table 10 in annex)

61. Major geographical areas with a low proportion of female workers to total workers in 1970 were Latin America (20 per cent), South Asia and Oceania (both 30 per cent) and Africa (31 per cent) Females constituted 34 per cent of the total labour force in Europe and Northern America in 1970 (the same as the world average) and 38 per cent in East Asia, while the USSR showed 50 per cent or well above the world average (see table 10) Regions with particularly low proportions of female workers were Northern Africa (7 per cent), Middle America (16 per cent), Micronesia and Polynesia (16 per cent) and Tropical South America (20 per cent)

62. By the year 2000, according to the projections, these proportions are expected to increase in East Asia to 39 per cent, in Northern America to 38 per cent, in Europe to 37 per cent and in Oceania to 35 per cent No change is expected for the Latin American region (20 per cent), and slight decreases are indicated for the USSR (to 47 per cent), Africa (to 30 per cent) and South Asia (to 29 per cent)

63. It can be seen that women are and will continue to be a very important part of the world's labour force. Should the trend towards greater utilization of women in non-agricultural activities be sharply accelerated, particularly in populous regions which also have relatively low labour force participation rates (Latin America, Africa and South Asia), the projections for the year 2000 may prove to be conservative.

The non-active population

64 The dependency patterns which emerge from the estimates and projections of population and labour force show striking interregional differences. The number of non-active persons per 1,000 active persons in the more developed regions of the world in 1970 is estimated at 1,231, as compared with 1,483 in the less developed regions In the year 2000, according to the medium variant of population projection, this ratio is expected to decrease to about 1,180 dependants per 1,000 active persons in the more developed regions; whereas in the less developed regions, despite a relatively greater increase in the labour force, the ratio is expected to increase to 1,650 dependants, thus widening the "dependency gap" from 252 in 1970 to about 470 in the year 2000

65 The differences between the age compositions of the dependent populations are also notable. In 1970, of the 1,231 dependants per 1,000 active persons in the more developed regions, 742 were under 25 years of age, 219 were aged 25 to 54 and 270 were aged 55 and over In the less developed regions, per 1,000 active persons there were as many as 1,152 dependants under 25 years of age, 222 aged 25 to 54 and 109 aged 55 and over

66 According to the projections for the year 2000, the number of dependants under age 25 is expected to decrease in the more developed regions whatever variant of population growth is used, viz, to 654 using the medium variant, 590 for the low variant or 729 for the high variant. In the less developed regions, dependants aged under 25 would show a small increase to 1,218 according to the medium variant and a large increase to 1,332 according to the high variant, while for the low variant there would be a small decrease to 1,103.

67. For dependants aged under 25, the dependency rates in 1970 were particularly high in Latin America (1,661 per 1,000 active persons), Africa (1,301) and South Asia (1,258) These high rates may be contrasted with the USSR (679), Europe (692) and East Asia (836) In the "younger populations" of Northern America and Oceania, the figures were 948 and 901, respectively The highest dependency rates relating to non-active persons aged 55 and over were in Europe (331), Northern America (298) and Oceania (241). Moderate rates were shown by the USSR and Latin America (192 and 168, respectively), whereas very low levels were computed for East Asia (130), South Asia (95) and Africa (86) Results of the computations using the low, medium and high variants for the projections are given in table 11 (see annex). These figures show that differences between the more and less developed regions in the nature of the dependency burden will persist beyond the end of the present century

Note on the data

68 The data used in this paper have been obtained by combining the estimates and projections of total population prepared by the United Nations with the estimates and projections of labour force p ation rates prepared by the ILO

69. The population estimates and projections are the most recent set of comprehensive population data currently available. The world and regional data have been obtained by aggregating the results of separate estimates and projections of the total population by sex and age group for each country and territory of the world.[3]

70. The estimates and projections of labour force participation rates used to derive the estimates and projections of labour force are the result of an intensive research effort conducted by the Statistical Branch of the ILO over the past 10 years. They are based on the most comprehensive labour force information available anywhere. These rates, derived on a country-by-country basis, have been reviewed by national and international experts and by several regional and interregional seminars and working groups. Comparisons of the projections from 1960 to 1970 to available census returns for 1970 show that the data represent a reasonably valid picture of present-day levels of regional activity rates and of their patterns of change.[4]

[3] United Nations, "World population prospects as assessed in 1973" (preliminary results issued March 1974). These projections take into account the results of the 1970 round of population censuses available as of December 1973 and supersede the projections published in *World Population Prospects as Assessed in 1968*, Population Studies, No. 53 (United Nations publication, Sales No. 72.XIII.4). For more details on these projections and the assumptions on which they are based see United Nations Population Division, "World and regional population prospects", *Population Debate*, vol. I, part two.

71. The scheme of regionalization set forth in the tables which follow is according to United Nations practice. The "less developed regions" of the world comprise all of Africa, Asia (excluding Japan), Latin America (excluding Temperate South America) and Oceania (excluding Australia and New Zealand). The "more developed regions" comprise Europe, the USSR, Northern America, Temperate South America, Japan, Australia and New Zealand.

72. The composition of major areas is also according to United Nations practice. These are set forth in table 3. Their presentation, including the designations employed, does not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country or territory or of its authorities or concerning the delimitation of its frontiers.

[4] The labour force participation rates of the total population by sex and age group and the levels and patterns of change in such rates for each five-year period from 1950 to 1985 are set out in ILO, *Labour Force Projections, 1965-1985*, 1st ed., part I: *Asia*, part II: *Africa*, part III: *Latin America*, part IV: *Europe, Northern America, Oceania and USSR*, part V: *World Summary* (Geneva, 1971, trilingual); and part VI: *Methodological Supplement* (Geneva, 1973, issued separately in English, French and Spanish). The labour force for the years 1990 and 2000 represents the extrapolation of the 1950 and 1985 labour force participation rate trends by sex and age group for the 24 world regions depicted in part V: *World Summary*. For more details on the estimates and projections of labour force participation rates and the methods used, see part VI: *Methodological Supplement*.

ANNEX

TABLE 3. COMPOSITION OF MAJOR AREAS AND COMPONENT REGIONS

Area and region	*Area and region*
Africa	*Africa* (continued)
	United Republic of Cameroon
Eastern Africa [a]	Zaire
Burundi	
Ethiopia	Northern Africa [d]
Kenya	Algeria
Madagascar	Egypt
Malawi	Libyan Arab Republic
Mauritius [b]	Morocco
Mozambique	Sudan
Réunion	Tunisia
Rwanda	
Somalia	Southern Africa
Southern Rhodesia	Botswana
Uganda	Lesotho
United Republic of Tanzania	Namibia
Zambia	South Africa
	Swaziland
Middle Africa [c]	
Angola	Western Africa [e]
Central African Republic	Dahomey
Chad	Gambia
Congo	Ghana
Equatorial Guinea	Guinea
Gabon	Guinea-Bissau

TABLE 3 (*continued*)

Area and region	*Area and region*
Africa (continued)	*Latin America* (continued)
Ivory Coast	Other Caribbean [g]
Liberia	
Mali	Middle America [h]
Mauritania	Costa Rica
Niger	El Salvador
Nigeria	Guatemala
Senegal	Honduras
Sierra Leone	Mexico
Togo	Nicaragua
Upper Volta	Panama
Latin America	Temperate South America [i]
	Argentina
Caribbean	Chile
Bahamas	Uruguay
Barbados	
Cuba	Tropical South America [j]
Dominican Republic	Bolivia
Grenada	Brazil
Guadeloupe	Colombia
Haiti	Ecuador
Jamaica	Guyana
Martinique	Paraguay
Puerto Rico	Peru
Trinidad and Tobago	Surinam
Windward Islands [f]	Venezuela

TABLE 3 (*continued*)

Area and region
Latin America (continued)
Northern America[k]
Canada
United States of America
East Asia
China
Japan
Other East Asia[l]
Hong Kong
Korea, Democratic People's Republic of
Korea, Republic of
Mongolia
South Asia
Eastern South Asia[m]
Burma
Indonesia[n]
Khmer Republic
Laos
Malaysia
Philippines
Portuguese Timor
Singapore
Thailand
Viet-Nam, Democratic Republic of
Viet-Nam, Republic of
Middle South Asia[o]
Afghanistan
Bangladesh
India
Iran
Maldives
Nepal
Pakistan
Sri Lanka
Western South Asia[p]
Bahrain
South Asia (continued)
Cyprus
Democratic Yemen
Iraq
Israel
Jordan
Kuwait
Lebanon
Oman
Qatar
Saudi Arabia
Syrian Arab Republic
Turkey
United Arab Emirates
Yemen
Europe
Eastern Europe
Bulgaria
Czechoslovakia
German Democratic Republic
Hungary
Poland
Romania
Northern Europe[q]
Denmark
Finland
Iceland
Ireland
Norway
Sweden
United Kingdom of Great Britain and Northern Ireland
Southern Europe[r]
Albania
Greece
Italy
Malta
Portugal
Spain
Yugoslavia

TABLE 3 (*continued*)

Area and region
Europe (continued)
Western Europe[s]
Austria
Belgium
France
Germany, Federal Republic of
Luxembourg
Netherlands
Switzerland
Oceania
Australia and New Zealand
Oceania (continued)
Australia
New Zealand
Melanesia
Papua-New Guinea
Other Melanesia[t]
Micronesia and Polynesia
Micronesia[u]
Polynesia
Fiji
Other Polynesia[v]
USSR

[j] Including French Guiana

[k] Including Bermuda, Greenland and St Pierre and Miquelon

[l] Including Macau

[m] Including Brunei

[n] Including Irian

[o] Including Sikkim

[v] Including American Samoa, Cook Islands, French Polynesia, Tonga, Wallis and Futuna Islands and Western Samoa.

TABLE 4 WORLD LABOUR FORCE BY MAJOR AREAS AND REGIONS, 1970, AND ACCORDING TO LOW, MEDIUM AND HIGH VARIANT OF POPULATION PROJECTIONS FOR 1980, 1990 AND 2000, DATA OF INTERNATIONAL LABOUR OFFICE

(Millions)

		Low variant			*Medium variant*			*High variant*		
Area and region	*1970*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
World	*1,507*	*1,776*	*2,099*	*2,462*	*1,779*	*2,115*	*2,528*	*1,781*	*2,127*	*2,583*
More developed regions	486	543	588	619	543	588	627	543	590	639
Less developed regions	1,021	1,234	1,512	1,844	1,236	1,527	1,901	1,238	1,538	1,944
Africa	*134*	*168*	*214*	*274*	*168*	*215*	*280*	*168*	*216*	*285*
Eastern Africa	42	53	69	88	53	69	90	53	70	92
Middle Africa	17	20	25	31	20	25	32	20	25	32
Northern Africa	23	30	40	51	30	40	53	30	40	54
Southern Africa	8	11	14	18	11	14	19	11		19
Western Africa	43	53	67	85	53	67	87			88

TABLE 4 (*continued*)

Area and region	*1970*	*Low variant* *1980*	*1990*	*2000*	*Medium variant* *1980*	*1990*	*2000*	*High variant* *1980*	*1990*	*2000*
Latin America	*88*	*113*	*147*	*188*	*113*	*147*	*192*	*113*	*147*	*195*
Caribbean	9	11	14	17	11	14	17	11	14	18
Middle America	19	26	35	47	26	35	48	26	36	49
Temperate South America	13	15	17	19	15	17	19	15	17	19
Tropical South America	47	61	81	105	61	81	107	61	81	109
Northern America	*90*	*105*	*118*	*129*	*105*	*118*	*132*	*105*	*119*	*138*
East Asia	*436*	*498*	*566*	*624*	*500*	*576*	*657*	*502*	*583*	*678*
China	365	416	474	524	418	483	556	420	490	576
Japan	53	58	62	64	58	62	65	58	62	65
Other East Asia	18	24	30	36	24	30	37	24	30	38
South Asia	*428*	*525*	*661*	*837*	*526*	*665*	*852*	*526*	*667*	*865*
Eastern South Asia	115	143	181	227	143	182	232	143	183	237
Middle South Asia	286	348	436	551	348	438	560	348	439	567
Western South Asia	27	35	45	58	35	45	60	35	46	61
Europe	*202*	*216*	*230*	*237*	*216*	*230*	*241*	*217*	*231*	*245*
Eastern Europe	52	56	59	61	56	59	61	56	59	62
Northern Europe	36	37	39	41	37	39	41	37	39	43
Southern Europe	50	53	58	61	54	58	62	54	58	63
Western Europe	64	70	75	75	70	75	76	70	75	77
Oceania	*8*	*10*	*12*	*14*	*10*	*12*	*14*	*10*	*12*	*15*
Australia and New Zealand	6	8	9	10	8	9	11	8	9	11
Melanesia	1	2	2	3	2	2	3	2	2	3
Micronesia and Polynesia	*	1	1	1	1	1	1	1	1	1
USSR	123	141	152	159	141	152	160	141	152	161

SOURCE: International Labour Office, Statistical Branch.
* Less than 500,000.

TABLE 5. WORLD POPULATION BY MAJOR AREAS AND REGIONS, 1970, AND ACCORDING TO LOW, MEDIUM AND HIGH VARIANT OF POPULATION PROJECTIONS FOR 1980, 1990 AND 2000; UNITED NATIONS DATA

(Millions)

Area and region	*1970*	*Low variant* *1980*	*1990*	*2000*	*Medium variant* *1980*	*1990*	*2000*	*High variant* *1980*	*1990*	*2000*
World	*3,621*	*4,351*	*5,174*	*5,999*	*4,401*	*5,346*	*6,407*	*4,441*	*5,508*	*6,803*
More developed regions	1,084	1,175	1,253	1,314	1,183	1,282	1,368	1,195	1,319	1,436
Less developed regions	2,537	3,176	3,920	4,685	3,218	4,064	5,039	3,247	4,190	5,367
Africa	*352*	*460*	*605*	*768*	*462*	*622*	*834*	*464*	*634*	*878*
Eastern Africa	100	132	176	225	132	180	246	132	183	258
Middle Africa	40	51	66	84	51	67	89	51	68	93
Northern Africa	86	113	149	188	114	154	202	115	158	216
Southern Africa	24	32	41	51	32	42	56	32	43	59
Western Africa	101	132	174	221	133	179	241	133	181	252
Latin America	*284*	*370*	*470*	*573*	*374*	*489*	*625*	*377*	*506*	*676*
Caribbean	26	31	38	45	32	40	49	32	41	52
Middle America	67	92	123	160	93	128	173	94	133	187
Temperate South America	36	42	46	51	42	48	53	42	48	54
Tropical South America	155	205	262	318	207	274	351	210	285	383
Northern America	*226*	*246*	*266*	*279*	*249*	*275*	*296*	*256*	*296*	*334*
East Asia	*926*	*1,056*	*1,167*	*1,269*	*1,087*	*1,235*	*1,373*	*1,103*	*1,288*	*1,463*
China	772	878	971	1,056	907	1,033	1,152	923	1,083	1,236
Japan	104	117	125	131	118	126	133	118	127	134
Other East Asia	50	61	72	82	62	75	88	63	78	93
South Asia	*1,111*	*1,443*	*1,843*	*2,248*	*1,449*	*1,885*	*2,384*	*1,456*	*1,929*	*2,529*
Eastern South Asia	285	372	475	577	374	490	617	376	505	659
Middle South Asia	749	967	1,232	1,502	971	1,255	1,584	975	1,281	1,677
Western South Asia	77	103	136	169	104	140	183	105	143	193

TABLE 5 (*continued*)

Area and region	*1970*	*Low variant* 1980	1990	2000	*Medium variant* 1980	1990	2000	*High variant* 1980	1990	2000
Europe	*459*	*485*	*504*	*519*	*488*	*515*	*540*	*491*	*527*	*562*
Eastern Europe	103	109	114	117	110	116	122	110	119	127
Northern Europe	80	83	86	89	84	88	91	85	91	98
Southern Europe	128	136	143	149	137	147	156	138	149	161
Western Europe	148	156	161	164	157	165	171	158	168	176
Oceania	*19*	*23*	*27*	*30*	*24*	*28*	*33*	*24*	*29*	*35*
Australia and New Zealand	15	18	20	22	18	22	25	19	22	26
Melanesia	3	4	5	6	4	5	6	4	5	7
Micronesia and Polynesia	1	2	2	2	2	2	3	2	2	3
USSR	243	268	292	311	269	297	321	269	299	325

SOURCE: United Nations, *World Population Prospects as Assessed in 1973* (preliminary results)

TABLE 6 LABOUR FORCE: ANNUAL RATES OF GROWTH BY MAJOR AREAS AND REGIONS, ACCORDING TO LOW, MEDIUM AND HIGH VARIANTS OF TOTAL POPULATION PROJECTIONS, 1970-2000

Area	*Low variant* 1970-1980	1980-1990	1990-2000	*Medium variant* 1970-1980	1980-1990	1990-2000	*High variant* 1970-1980	1980-1990	1990-2000
World	1.7	1.7	1.6	1.7	1.8	1.8	1.7	1.8	2.0
More developed regions	1.1	0.8	0.5	1.1	0.8	0.7	1.1	0.8	0.8
Less developed regions	1.9	2.1	2.0	1.9	2.1	2.2	2.0	2.2	2.4
Africa	2.3	2.5	2.5	2.3	2.5	2.7	2.3	2.6	2.8
Eastern Africa	2.4	2.6	2.6	2.5	2.7	2.7	2.5	2.7	2.9
Middle Africa	1.9	2.1	2.2	1.9	2.1	2.3	1.9	2.2	2.4
Northern Africa	2.7	2.7	2.6	2.7	2.8	2.8	2.7	2.8	2.9
Southern Africa	2.4	2.4	3.1	2.4	2.4	3.3	2.4	2.4	3.4
Western Africa	2.1	2.3	2.4	2.1	2.4	2.6	2.1	2.4	2.7
Latin America	2.6	2.6	2.5	2.6	2.7	2.7	2.6	2.7	2.9
Caribbean	2.2	2.4	2.1	2.2	2.5	2.3	2.2	2.5	2.4
Middle America	3.1	3.1	2.9	3.1	3.1	3.1	3.1	3.2	3.3
Temperate South America	1.4	1.4	1.2	1.4	1.4	1.3	1.4	1.4	1.3
Tropical South America	2.7	2.7	2.7	2.7	2.8	2.9	2.7	2.8	3.0
Northern America	*1.6*	*1.2*	*0.9*	*1.6*	*1.2*	*1.1*	*1.6*	*1.2*	*1.5*
East Asia	1.3	1.3	1.0	1.4	1.4	1.3	1.4	1.5	1.5
China	1.3	1.3	1.0	1.4	1.5	1.4	1.4	1.6	1.6
Japan	0.9	0.7	0.3	0.9	0.7	0.4	0.9	0.7	0.5
Other East Asia	2.7	2.3	1.8	2.8	2.3	2.0	2.8	2.3	2.1
South Asia	2.1	2.3	2.4	2.1	2.4	2.5	2.1	2.4	2.6
Eastern South Asia	2.2	2.4	2.3	2.2	2.5	2.5	2.2	2.5	2.6
Middle South Asia	2.0	2.3	2.4	2.0	2.3	2.5	2.0	2.4	2.6
Western South Asia	2.4	2.6	2.7	2.4	2.7	2.8	2.5	2.7	2.9
Europe	0.7	0.6	0.3	0.7	0.6	0.5	0.7	0.6	0.6
Eastern Europe	0.7	0.5	0.3	0.7	0.5	0.4	0.7	0.5	0.6
Northern Europe	0.4	0.5	0.4	0.3	0.5	0.6	0.4	0.6	0.8
Southern Europe	0.7	0.7	0.6	0.7	0.8	0.8	0.7	0.8	0.9
Western Europe	0.9	0.7	0.0	0.9	0.7	0.2	0.9	0.7	0.3
Oceania	2.0	1.8	1.7	2.0	1.9	2.0	2.0	1.9	[illegible]
Australia and New Zealand	1.9	1.7	1.5	1.9	1.7	1.9	2.0	1.8	[illegible]
Melanesia	2.2	2.3	2.2	2.2	2.4	2.4	2.2	2.4	[illegible]
Micronesia and Polynesia	2.9	2.5	2.0	2.9	2.6	2.2	2.9	2.7	[illegible]
USSR	1.4	0.7	0.4	1.4	0.7	0.5	1.4	[illegible]	[illegible]

SOURCE: International Labour Office, Statistical Branch.

TABLE 7. TOTAL POPULATION: ANNUAL RATES OF GROWTH BY MAJOR AREAS AND REGIONS, ACCORDING TO LOW, MEDIUM AND HIGH VARIANTS OF TOTAL POPULATION PROJECTIONS, 1970-2000

Area	Low variant			Medium variant			High variant		
	1970-1980	1980-1990	1990-2000	1970-1980	1980-1990	1990-2000	1970-1980	1980-1990	1990-2000
World	1.9	1.8	1.5	2.0	2.0	1.8	2.1	2.2	2.1
More developed regions	0.8	0.7	0.5	0.9	0.8	0.7	1.0	1.0	0.9
Less developed regions	2.3	2.1	1.8	2.4	2.4	2.2	2.5	2.6	2.5
Africa	2.7	2.8	2.4	2.8	3.0	3.0	2.8	3.2	3.3
Eastern Africa	2.8	2.9	2.5	2.8	3.2	3.2	2.9	3.3	3.5
Middle Africa	2.4	2.6	2.4	2.5	2.7	2.8	2.5	2.9	3.2
Northern Africa	2.8	2.8	2.3	2.9	3.0	2.8	3.0	3.2	3.2
Southern Africa	2.8	2.6	2.3	2.8	2.9	2.8	2.9	3.1	3.1
Western Africa	2.7	2.8	2.4	2.7	3.0	3.0	2.8	3.1	3.4
Latin America	2.7	2.4	2.0	2.8	2.7	2.5	2.9	3.0	2.9
Caribbean	2.1	1.9	1.7	2.2	2.2	2.1	2.3	2.5	2.4
Middle America	3.2	3.0	2.7	3.3	3.3	3.0	3.4	3.6	3.5
Temperate South America	1.3	1.1	0.9	1.4	1.3	1.0	1.4	1.4	1.2
Tropical South America	2.8	2.5	2.0	2.9	2.8	2.5	3.1	3.1	3.0
Northern America	0.8	0.8	0.5	1.0	1.0	0.7	1.2	1.5	1.2
East Asia	1.3	1.0	0.8	1.6	1.3	1.1	1.8	1.6	1.3
China	1.3	1.0	0.9	1.6	1.3	1.1	1.8	1.6	1.3
Japan	1.2	0.6	0.5	1.2	0.7	0.5	1.2	0.8	0.6
Other East Asia	2.0	1.7	1.3	2.1	2.0	1.6	2.3	2.2	1.8
South Asia	2.6	2.5	2.0	2.7	2.7	2.4	2.7	2.9	2.7
Eastern South Asia	2.7	2.5	2.0	2.8	2.7	2.3	2.8	3.0	2.7
Middle South Asia	2.6	2.5	2.0	2.6	2.6	2.4	2.7	2.8	2.7
Western South Asia	3.0	2.8	2.2	3.0	3.0	2.7	3.1	3.2	3.0
Europe	0.6	0.4	0.3	0.6	0.5	0.5	0.7	0.7	0.7
Eastern Europe	0.6	0.4	0.3	0.6	0.5	0.5	0.7	0.7	0.7
Northern Europe	0.4	0.3	0.3	0.4	0.4	0.4	0.6	0.7	0.8
Southern Europe	0.7	0.5	0.4	0.7	0.7	0.6	0.8	0.8	0.8
Western Europe	0.5	0.3	0.2	0.6	0.5	0.4	0.7	0.6	0.5
Oceania	1.9	1.5	1.2	2.0	1.9	1.6	2.1	2.0	1.9
Australia and New Zealand	1.7	1.2	0.9	1.8	1.6	1.3	1.9	1.8	1.6
Melanesia	2.6	2.6	2.3	2.7	2.8	2.8	2.7	3.0	3.1
Micronesia and Polynesia	2.5	2.3	1.9	2.6	2.4	2.0	2.9	2.7	2.3
USSR	1.0	0.9	0.6	1.0	1.0	0.8	1.0	1.1	0.9

SOURCE: United Nations, *World Population Prospects as Assessed in 1973* (preliminary results).

TABLE 8. LABOUR FORCE PARTICIPATION RATES, BY SEX AND AGE GROUP, BY MAJOR AREAS, 1970 AND 2000

(Percentage)

Area	Year	All ages	Age group						
			10-14	15-19	20-24	25-44	45-54	55-64	65 and over
			Males						
World	1970	54.69	15.74	60.42	87.57	96.59	94.67	83.76	42.69
	2000	52.33	6.18	41.66	81.38	96.28	92.68	76.60	25.99
More developed regions	1970	57.25	2.42	50.43	85.87	96.39	93.64	80.70	27.10
	2000	56.56	0.51	33.98	79.83	96.80	92.61	75.55	12.58
Less developed regions	1970	53.65	20.22	64.04	88.24	96.69	95.21	85.92	56.65
	2000	51.22	7.24	43.21	81.71	96.13	92.71	77.10	34.53
Africa	1970	52.42	26.91	68.82	90.81	97.53	96.59	90.81	65.80
	2000	47.04	12.21	50.06	84.21	96.59	94.35	83.89	45.02
Latin America	1970	49.68	12.70	61.18	89.83	96.91	93.86	82.09	49.55
	2000	48.98	3.14	38.60	81.92	97.94	92.05	75.17	26.58

TABLE 8 (*continued*)

Area	Year	All ages	Age group 10-14	15-19	20-24	25-44	45-54	55-64	65 and over
Northern America	1970	53.10	1 22	37 45	83 95	95 19	92 96	82 17	21.70
	2000	56 40	0 22	25.72	80 05	95 88	92 46	76 98	8 66
East Asia	1970	57 38	12 91	60 00	86 69	96 43	94 64	83.17	49 00
	2000	58 02	2 90	37.48	79 82	95 79	91.76	73.92	26 06
South Asia	1970	52 74	23 94	64 98	87.91	96 66	95 57	87 68	61.75
	2000	49 86	7 85	44 02	81.66	95 83	93 41	78 90	39.70
Europe	1970	59 63	3 79	58 99	87 61	97 32	94 99	81 32	26 38
	2000	57.17	0 74	38 60	79 53	97 22	93 57	75.45	12 80
Oceania	1970	57.43	8 09	62 79	92 18	98 23	96 54	85.79	21.20
	2000	55 48	5 07	43 51	84 08	97.69	95 40	82 67	12 13
USSR	1970	54 68	1 16	49 90	84 97	95.17	90 18	76 80	30 60
	2000	54 82	0 35	35 40	80 32	96 64	90 21	72 11	13 65
			Females						
World	1970	28.51	11 00	39.14	49 00	48 59	48 57	35 51	15 16
	2000	26 44	4 81	23 86	43 76	46 63	51 03	34 66	10 03
More developed regions	1970	33 22	1 94	42 25	61 07	53 50	52 19	35.73	12 62
	2000	35 53	0 41	27 97	64 89	59.36	63 16	39.22	7.83
Less developed regions	1970	26 39	14 05	38 01	44 12	46 18	46 18	35 33	18 36
	2000	23 90	5 63	23 04	39 24	42 97	45 84	32 35	11 86
Africa	1970	23 75	15 49	35 09	39 73	41 98	43 84	36 23	19 88
	2000	20 34	7 63	24 64	35 64	38 57	42 43	34 92	14 96
Latin America	1970	12 08	4 12	21 23	27 08	20 87	18 59	14 12	7 62
	2000	12 28	1 43	16 69	30 39	21 03	18 64	11 43	3 69
Northern America	1970	26 85	0 56	25.55	46 84	42 30	52 00	38 95	9 70
	2000	33 13	0 04	15 91	47 24	50 21	67 04	48 88	7.72
East Asia	1970	36 31	10 22	50 07	62 97	60 29	57 77	41 40	20 79
	2000	37.57	2.50	28 21	59 62	61 58	61 14	39.73	12 59
South Asia	1970	23 54	18 04	32 79	36 64	41.79	41 98	33 36	16.28
	2000	20 97	6 91	21 74	33 50	38 41	41 25	30 80	11 23
Europe	1970	29 11	2 45	46 02	59 28	45 27	43 79	30 60	8 62
	2000	32.18	0 57	29.94	62.74	53 41	57 11	34 43	5 66
Oceania	1970	24.77	6 35	59 06	53 92	34 52	35 34	22 94	5.32
	2000	30 32	5 02	49 59	60 93	44 14	53 36	34 13	5.16
USSR	1970	46 89	2.86	53.54	78 07	80 03	72 46	44 16	24 71
	2000	45 19	0 55	35.36	83 41	83 59	76.23	42 40	12 45

SOURCE International Labour Office, Statistical Branch.

TABLE 9 SEX-AGE STRUCTURE OF THE WORLD'S LABOUR FORCE BY MAJOR AREAS, 1970, AND ACCORDING TO LOW, MEDIUM AND HIGH VARIANTS OF TOTAL POPULATION PROJECTIONS, 1985 AND 2000

(Thousands)

Area	Year	Males 10-24	Males 25-54	Males 55+	Females 10-24	Females 25-54	Females 55+
				Medium variant			
World	1970	276,317	585,415	130,006	162,597	291,982	60,806
	1985	330,242	800,048	161,862	185,663	386,589	76,105
	2000	384,177	1,106,958	195,182	208,702	540,702	92,402
More developed regions	1970	63,155	188,095	48,151	46,777	110,954	
	1985	61,151	234,779	53,212	46,517		
	2000	58,427	266,110	55,796			

TABLE 9 (*continued*)

Area	Year	Males			Females		
		10-24	25-54	55+	10-24	25-54	55+
Less developed regions ..	1970	213,162	397,320	81,855	115,820	181,028	32,083
	1985	269,091	565,269	108,650	139,146	246,863	42,714
	2000	325,750	840,848	139,386	162,762	374,175	57,892
Africa	1970	30,885	51,069	9,735	15,316	22,887	3,779
	1985	43,963	74,129	13,631	21,184	31,732	5,651
	2000	59,769	116,023	19,440	27,987	48,473	8,662
Latin America	1970	22,082	40,764	7,874	7,068	8,658	1,415
	1985	29,799	63,063	10,948	10,230	13,394	1,813
	2000	37,235	101,729	14,550	14,364	21,530	2,364
Northern America	1970	12,260	36,766	9,934	7,187	18,400	5,389
	1985	12,257	49,014	10,372	7,351	26,367	7,100
	2000	11,956	59,825	10,169	6,893	35,125	7,983
East Asia	1970	73,284	160,533	36,591	53,843	92,799	18,537
	1985	72,894	216,267	45,756	51,850	124,236	23,279
	2000	72,344	274,556	53,970	52,900	174,648	28,755
South Asia	1970	95,491	171,329	33,365	46,101	70,428	11,092
	1985	129,661	244,244	45,615	61,142	94,776	15,669
	2000	163,700	383,231	60,285	73,442	148,574	22,543
Europe	1970	27,241	81,776	23,981	18,819	38,982	10,900
	1985	26,073	96,621	24,031	18,740	47,901	11,716
	2000	22,877	105,832	24,161	17,235	58,489	12,027
Oceania	1970	1,449	3,420	779	1,009	1,144	218
	1985	1,679	4,703	979	1,265	1,767	332
	2000	1,953	6,292	1,121	1,645	2,864	472
USSR	1970	13,625	39,758	7,747	13,254	38,684	9,476
	1985	13,916	52,007	10,530	13,901	46,416	10,545
	2000	14,343	59,470	11,486	14,236	50,999	9,596
				Low variant			
World	1970	276,317	585,415	130,006	162,597	291,982	60,806
	1985	329,146	798,201	160,970	184,805	385,588	75,698
	2000	359,268	1,093,640	192,641	192,867	532,813	91,156
More developed regions	1970	63,155	188,095	48,151	46,777	110,954	28,723
	1985	61,138	234,965	53,226	46,488	139,813	33,404
	2000	54,150	265,428	55,861	42,703	166,153	34,558
Less developed regions	1970	213,162	397,320	81,855	115,820	181,028	32,083
	1985	268,008	563,236	107,744	138,317	245,775	42,294
	2000	305,118	828,212	136,780	150,164	366,660	56,598
Africa	1970	30,885	51,069	9,735	15,316	22,887	3,779
	1985	43,841	73,920	13,539	21,130	31,657	5,620
	2000	57,216	114,760	19,045	26,797	47,978	8,507
Latin America	1970	22,082	40,764	7,874	7,068	8,658	1,415
	1985	29,768	63,064	10,948	10,216	13,394	1,813
	2000	34,783	101,306	14,550	13,373	21,435	2,364
Northern America	1970	12,260	36,766	9,934	7,187	18,400	5,389
	1985	12,255	49,014	10,372	7,350	26,367	7,100
	2000	10,672	59,471	10,169	6,153	34,945	7,983
East Asia	1970	73,284	160,533	36,591	53,843	92,799	18,537
	1985	72,202	215,071	45,183	51,255	123,497	22,977
	2000	61,949	266,661	52,703	45,337	169,433	28,049
South Asia	1970	95,491	171,329	33,365	46,101	70,428	11,092
	1985	129,423	243,617	45,374	60,975	94,502	15,583
	2000	158,019	380,120	59,346	70,230	146,845	22,113
Europe	1970	27,241	81,776	23,981	18,819	38,982	10,900
	1985	26,065	96,813	24,045	18,714	47,989	11,729
	2000	21,175	105,691	24,227	15,923	58,406	12,075

TABLE 9 (*continued*)

Area	Year	Males 10-24	Males 25-54	Males 55+	Females 10-24	Females 25-54	Females 55+
Oceania ..	1970	1,449	3,420	779	1,009	1,144	218
	1985	1,676	4,695	979	1,265	1,766	331
	2000	1,748	6,248	1,115	1,447	2,845	469
USSR	1970	13,625	39,758	7,747	13,254	38,684	9,476
	1985	13,916	52,007	10,530	13,900	46,416	10,545
	2000	13,706	59,383	11,486	13,607	50,926	9,596
				High variant			
World	1970	276,317	585,415	130,006	162,597	291,982	60,806
	1985	330,941	801,749	162,540	186,220	387,612	76,501
	2000	405,575	1,117,695	197,664	221,482	546,651	93,611
More developed regions	1970	63,155	188,095	48,151	46,777	110,954	28,723
	1985	61,192	235,137	53,230	46,509	139,832	33,406
	2000	63,583	268,223	55,903	49,391	167,479	34,562
Less developed regions	1970	213,162	397,320	81,855	115,820	181,028	32,083
	1985	269,749	566,612	109,310	139,711	247,780	43,095
	2000	341,992	849,472	141,761	172,091	379,172	59,049
Africa	1970	30,885	51,069	9,735	15,316	22,887	3,779
	1985	44,043	74,262	13,691	21,230	31,802	5,678
	2000	61,673	117,049	19,791	28,814	48,949	8,818
Latin America	1970	22,082	40,764	7,874	7,068	8,658	1,415
	1985	29,835	63,064	10,948	10,243	13,394	1,813
	2000	39,433	102,143	14,550	15,237	21,613	2,364
Northern America	1970	12,260	36,766	9,934	7,187	18,400	5,389
	1985	12,261	49,013	10,372	7,353	26,367	7,100
	2000	14,912	60,808	10,168	8,591	35,623	7,982
East Asia ..	1970	73,284	160,533	36,591	53,843	92,799	18,537
	1985	73,356	217,349	46,313	52,254	124,938	23,590
	2000	78,344	279,868	55,373	57,241	178,096	29,498
South Asia ...	1970	95,491	171,329	33,365	46,101	70,428	11,092
	1985	129,740	244,369	45,656	61,243	94,921	15,712
	2000	169,947	385,086	60,903	76,836	149,565	22,801
Europe	1970	27,241	81,776	23,981	18,819	38,982	10,900
	1985	26,100	96,950	24,048	18,725	47,999	11,730
	2000	24,621	106,775	24,261	18,552	58,826	12,077
Oceania	1970	1,449	3,420	779	1,009	1,144	218
	1985	1,689	4,735	982	1,270	1,775	333
	2000	2,060	6,408	1,132	1,736	2,906	475
USSR	1970	13,625	39,758	7,747	13,254	38,684	9,476
	1985	13,917	52,007	10,530	13,902	46,416	10,545
	2000	14,585	59,558	11,486	14,475	51,073	9,596

SOURCE: International Labour Office, Statistical Branch.

TABLE 10 NUMBER OF ACTIVE FEMALES PER 1,000 ACTIVE PERSONS BY MAJOR AREAS AND REGIONS, 1970-2000

Area or region	1970	1980	1990	2000
World	342	337	333	333
More developed regions	384	386	387	394
Less developed regions	322	316	313	313
Africa	314	310	306	304
Eastern Africa	350	349	343	333
Middle Africa	383	369	361	356
Northern Africa	72	74	75	75

TABLE 10 (*continued*)

Area or region	1970	1980	1990	2000
Southern Africa	276	283	297	325
Western Africa	391	389	388	388
Latin America	195	196	198	199
Caribbean	280	283	285	288
Middle America	158	161	163	164
Temperate South America	220	224	236	255
Tropical South America	188	189	191	191
Northern America ..	[illegible]	[illegible]	[illegible]	379

TABLE 10 (*continued*)

Area or region	*1970*	*1980*	*1990*	*2000*
East Asia	379	375	379	390
China	379	375	381	393
Japan	395	391	394	398
Other East Asia	332	327	331	338
South Asia	298	294	288	287
Eastern South Asia	363	355	348	341
Middle South Asia	276	272	266	267
Western South Asia	262	260	259	261
Europe	341	346	352	365
Eastern Europe	424	423	421	426

TABLE 10 (*continued*)

Area or region	*1970*	*1980*	*1990*	*2*
Northern Europe	331	344	356	3
Southern Europe	256	267	282	3
Western Europe	345	345	349	3
Oceania	296	308	324	3
Australia and New Zealand	281	296	317	3
Melanesia	403	403	401	3
Micronesia and Polynesia	158	167	173	1
USSR	501	488	473	4

SOURCE: International Labour Office, Statistical Branch.

TABLE 11. DEPENDENCY RATIOS: NON-ACTIVE PERSONS PER 1,000 ACTIVE PERSONS, 1970-2000; MAJOR AREAS OF THE WORLD

		Low variant			*Medium variant*			*High variant*		
	1970	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*20*
					Non-active persons of all ages per 1,000 active persons (all ages)					
World	1,402	1,449	1,464	1,436	1,473	1,527	1,534	1,493	1,589	1,6
More developed regions	1,231	1,164	1,132	1,122	1,179	1,180	1,180	1,200	1,236	1,2
Less developed regions	1,483	1,574	1,593	1,541	1,602	1,660	1,650	1,621	1,724	1,7
Africa	1,630	1,741	1,828	1,801	1,751	1,887	1,973	1,759	1,929	2,0
Latin America	2,235	2,268	2,200	2,052	2,302	2,324	2,258	2,333	2,434	2,4
Northern America	1,517	1,337	1,252	1,159	1,365	1,327	1,244	1,433	1,493	1,4
East Asia	1,126	1,122	1,062	1,032	1,174	1,145	1,089	1,200	1,209	1,1
South Asia	1,597	1,747	1,787	1,686	1,757	1,833	1,798	1,769	1,891	1,9
Europe	1,275	1,239	1,191	1,185	1,255	1,239	1,244	1,268	1,281	1,2
Oceania	1,420	1,386	1,306	1,197	1,415	1,409	1,321	1,428	1,452	1,3
USSR	981	895	921	960	902	953	1,005	906	963	1,0
					Non-active persons aged 0-24 per 1,000 active persons (all ages)					
World	1,020	1,039	1,029	974	1,063	1,093	1,078	1,083	1,155	1,1
More developed regions	742	661	617	590	677	666	654	697	723	7
Less developed regions	1,152	1,205	1,190	1,103	1,233	1,258	1,218	1,251	1,321	1,3
Africa	1,301	1,391	1,450	1,395	1,402	1,510	1,569	1,409	1,552	1,6
Latin America	1,661	1,660	1,553	1,368	1,694	1,677	1,587	1,725	1,790	1,7
Northern America	948	770	681	618	798	757	712	866	925	9
East Asia	836	786	693	628	837	777	693	862	841	7
South Asia	1,258	1,376	1,386	1,254	1,386	1,432	1,367	1,398	1,490	1,4
Europe	692	642	596	576	658	644	643	671	688	7
Oceania	901	866	794	709	895	898	846	909	943	9
USSR	679	581	579	575	588	612	623	592	622	6
					Non-active persons aged 55 years and over per 1,000 active persons (all ages)					
World	161	174	187	202	175	187	200	175	187	1
More developed regions	270	291	310	337	291	310	332	290	309	3
Less developed regions	109	123	139	157	124	140	156	124	141	1
Africa	86	94	106	120	94	107	121	94	107	1
Latin America	168	187	203	221	187	203	217	187	202	2
Northern America	298	307	307	300	307	306	294	307	305	2
East Asia	130	152	176	209	153	176	205	154	178	2
South Asia	95	107	121	136	107	122	136	107	122	1
Europe	331	351	361	386	351	361	380	351	360	3
Oceania	241	250	248	241	250	247	233	249	246	2
USSR	192	215	249	291	215	249	288	215	249	2

SOURCE: International Labour Office, Statistical Branch.

EDUCATIONAL DEVELOPMENT: WORLD AND REGIONAL STATISTICAL TRENDS AND PROJECTIONS TO 1985

United Nations Educational, Scientific and Cultural Organization

1. This report is concerned with projections of educational development and with the effect of world population growth upon the future of education The purpose is to derive the implications of continuing until 1985 the education trends observed during the period 1960-1970.

2. The past is not always well documented and not even the crudest of indexes is reliably available for all countries. The base data reported here are the number of children in three selected age ranges who are, according to information collected by the United Nations Educational, Scientific and Cultural Organization (UNESCO), enrolled in education. Dividing these enrolment figures by the total number of children in the same age ranges in the population gives the so-called "enrolment ratios" which are extensively used in this paper.

3. The projections presented here are not predictions but continuations of trends of indexes from the past into the future. They do not take in account future plans or expressed intentions to change future circumstances, however well-founded and planned these intentions may be. In some sense, they can be regarded as invitations to counteract perceptible trends and, for this reason, the majority of the paper is addressed to questions which are, and have been, of vital concern to the countries concerned The report uses the future tense in referring to the projections and their implications, avoiding the subjunctive mood in an attempt to make statements less complex. However, there should be no doubt in the reader's mind that the statements about the future are heavily qualified by the projection methods used and the limitations of the data available.

4 The task of deriving projections began with an examination of data available on enrolments. A base year of 1960 was established and important limitations on data availability became apparent. Annex I discusses briefly these problems and they are mentioned from time to time in the text. The main data problems will be summarized in what follows along with the basic assumptions on which the projections are based.

5 The demographic nature of the projections needed for the World Population Conference prescribed analysis and projections of enrolment by age although data on enrolment by age were less commonly available than data on enrolment by level For some countries, no such age data were available; and for many others, only partial data were available for the period 1960-1970 In all these cases, the age data had to be estimated as explained in annex I It should thus be noted that the enrolment ratios presented in this report are derived from data on enrolment by age and not, as often done in lack of such data, by dividing the enrolment at a given level (e g , primary education) by the size of the age range which according to national regulations should be enrolled at this level. Due to late entries and repetition in developing countries, this latter procedure was rejected as it often leads to gross overestimations of the enrolment ratios

6 Although projections by age were required, grouping of ages was desirable in order to simplify the analysis as well as to match as closely as possible the three levels of education. The age ranges 6-11, 12-17 and 18-29 were chosen A study of data (employing a principal component analysis) for countries for which age data by level were available confirmed that these ranges closely represented the age ranges of the majority of those enrolled in the first, second and third levels of education Thus, the three age ranges used throughout this report broadly characterize the respective levels of education and are referred to as first, second and third age ranges Occasionally there was some conflict between the first age range, 6-11, adopted for the study and the enrolment practices of some countries where the legal age of admission to primary education is 5 or 7 years, respectively

7. Projections were required by regions and continents. For all three age ranges, analysis of past trends was made country by country. The projections for the first range were also carried out separately for each individual country with subsequent aggregation to regions and continents For the second and third age ranges, projections were made directly for the regions (see annex I for more details). The composition of each of the 24 United Nations regions used in this paper is given in annex IV. The grouping of these regions into the two groups, more developed regions and less developed regions, was done by the Population Division of the United Nations and is based on fertility level. All regions with gross reproduction rates below 2 0 are considered to be more developed regions while regions with rates above 2 0 are considered to be less developed regions. According to this criterion, nine regions—Japan, the four European regions, the Union of Soviet Socialist Republics, Northern Americ m-

perate South America, and Australia and New Zealand—belong to the more developed regions.

8. The population estimates and projections used were obtained from the Population Division. These projections are currently under revision. The revised projections were not yet ready when the present report was completed and the provisional projections available have therefore been used. With the exception of the section which examines the effect of different hypotheses concerning population growth (see paras. 47-55), all tables and analyses presented in this paper are based on the "medium" population variant.

9. There were found to be marked differences between more and less developed regions in the trend of the enrolment in the first range, to the extent that it was necessary to base the projections for these two groups of regions on different methods, as reported fully in annex I. For the more developed regions with almost universal primary education, enrolments clearly followed population growth in the first range. For these regions it is the trend in the enrolment ratio for this range which has been projected. For the less developed regions, on the other hand, the growth in enrolment in the first range appeared, in general, to be relatively unrelated to population growth but to follow its own linear trend. Principally because of this indication of linear development in the enrolment in the first age range during the past decade, it is the trend in the number of pupils that has been prolonged for this age range for the less developed regions. Projections of enrolment ratios were obtained by combining these projections with the population estimates. Annex I discusses briefly the extent to which the results obtained for the less developed regions for the first range by the above method differ significantly from the results obtained by a method extrapolating the enrolment ratio for this age range. The conclusion is that the future ratios would only be slightly higher for South Asia and Africa than the ones presented in this paper, while the result would have been significantly different for Latin America.

10. With some exceptions, enrolments in the second and third ranges were projected indirectly and in the same manner for all regions, by estimating the percentage of the enrolment in a given range in a given year that remains in school six years later. These estimated percentages (education survival rates) were, in general, extended linearly into the future, and they were in turn used to derive projections of enrolment for the second and third ranges.

11. For all regions and all ranges, enrolment of males and females are analysed and projected separately.

12. The projections and analyses presented in this paper cover only 23 of the 24 regions listed in annex IV, the region omitted being the mainland region of East Asia (Region 1), which includes China, Hong Kong, Mongolia and Macau. Projections for this region could not be made because of the lack of data on education enrolment for China.

13. Remembering that the projections in this report are to be regarded as indexes of circumstances which may occur if action counter to prevailing trends is not taken, the report is organized around those issues in which counteraction, through implementation of educational policies, appears possible.

14. An extended version of the present report is being prepared. The extended version will provide a more detailed continental and regional analysis of the education issues highlighted here. Furthermore, work is currently being undertaken with a view to assess the patterns of disparities within and between developing countries in terms of access to education and effectiveness of educational systems. Of particular interest are the disparities between urban and rural areas. Work is also planned on projecting the future educational attainment of the population as well as of the out-of-school youth in developing countries. Some of the above mentioned work will be based on cross-sectional analysis of education development.

TRENDS IN ENROLMENT BETWEEN 1960 AND 1970

15. The rapid expansion of enrolment, which began in the early 1950s, continued during the 1960s to be a dominating factor in the educational development of most countries. During the first half of the decade, a large number of new States became independent. The new nations had inherited modestly developed educational systems and serious shortages of qualified manpower. The decade saw most of the developing countries, including the newly independent ones, committed to universal primary education, and serious efforts were made to reach this target as well as to meet the demand for qualified manpower.

16. This chapter highlights the most characteristic features of the enrolment growth during the decade. It addresses itself particularly to the following questions:

(*a*) Whether the disparities in enrolment ratios between the more developed regions and the less developed regions decreased during the past decade;

(*b*) Whether the disparities in enrolment between boys and girls decreased during the past decade;

(*c*) Whether the number of children out-of-school decreased during the decade.

The answers to these questions will help in the better understanding of the enrolment projections presented later as they are the consequences of the development during the last decade.

Disparities in enrolment ratios between more and less developed regions

17. Table 1 gives the number of pupils enrolled in the three age ranges for the years 1960, 1965 and 1970. It shows clearly that the growth of enrolment for the less developed regions was much higher than

for the more developed regions for all age ranges. Thus, the enrolment of children aged 6-11 years grew at a rate about six times more than for the more developed regions, while the two other ranges had a growth rate about twice that of the more developed regions In both regions, the enrolment in the third range grew most quickly, followed by the second range which in turn grew faster than the first range This is natural, as the second and third ranges began from a lower level of enrolment than the first range in the beginning of the decade The relatively low growth of the first range for the more developed regions occurred because 91 per cent of all children aged 6-11 were already enrolled in 1960, and the expansion during the decade was mainly determined by the growth of population which was modest. The table also shows that, apart from the second range for the more developed regions, the increase in the number of pupils enrolled was about the same during the first half of the decade as during the second half The considerably higher growth of enrolment for the second range of the more developed regions during the period 1960-1965 was caused by high population growth, which in turn was attributable to the post-war "baby boom".

TABLE 1. ENROLMENT BY AGE RANGES, BOTH SEXES
(Millions)

	Age range	*1960*	*1965*	*1970*
More developed regions	6-11	101	106	111
	12-17	72	92	100
	18-29	15	22	28
Less developed regions	6-11	99	136	171
	12-17	36	55	76
	18-29	5	9	13

18 The indication of almost linear growth in enrolment for the age range 6-11 for the less developed regions during the past decade is confirmed when examining the annual data and also when studying separately the development for each of the major developing continents. Thus, for the first age range, the enrolment in South Asia increased by 24 million between 1960 and 1965, and by 22 million during the period 1965-1970. For Africa, the increase was 5 million during each of the two five-year periods, while for Latin America the enrolment of pupils aged 6-11 years increased by 6 million during the first five years of the decade and by 7 million during the last five years This feature of the past development has important implications, should it continue into the future. As the population grows exponentially, a too low linear growth will impair the possibility of the less developed regions attaining their stated target of universal primary education. This is clearly illustrated by the projections presented later in this paper The linear growth in enrolment during the past decade for the less developed regions is, in fact, one of the major justifications for the projections method employed for the age range 6-11 for these regions, given that the purpose has been to examine the future implications should the trends during the past decade continue

19 The impact of linear growth in enrolment in the age range 6-11 on the annual growth rate of enrolment is illustrated by table 2, which shows these rates for the population aged 6-11 as well as for the number of pupils enrolled in this age range. The decline in the enrolment growth rate for the less developed regions in the last half of the decade should be noted. The more developed regions had a fairly stable rate, apart from the last two years, when decline is attributable to decreasing population growth as shown in the table. The figures for the less developed regions hide large variations between regions and continents Thus, while the annual growth rates for Latin America remained on a relatively high level during the decade, the rates for Asia and Africa declined to a lower level in the last part of the decade as compared to the first part.

20. Although declining, the growth of enrolment in the less developed regions was, however, at the end of the decade, still far above that of the more developed regions, even after the difference in population growth between the two regions is accounted for This indicates that the disparities in enrolment ratios between the two groups of regions declined during the past decade The enrolment ratios given in table 3 illustrate this fact However, the table shows also that although the relative difference in enrolment ratios between the two regions in 1970 was smaller than in 1960, the absolute difference was still substantial and even increased for the group aged 18-29 years.

TABLE 2. ANNUAL GROWTH RATES OF POPULATION AND ENROLMENT, AGE-RANGE 6-11, BOTH SEXES

	Annual growth rates									
	1960-1961	*1961-1962*	*1962-1963*	*1963-1964*	*1964-1965*	*1965-1966*	*1966-1967*	*1967-1968*	*1968-1969*	*1969-1970*
More developed regions										
Population	0.7	0.6	0.8	0.8	0.8	0.8	0.7	0.5	0.2	0.0
Enrolment	0.8	0.8	0.9	1.0	1.0	1.0	1.0	1.1	0.5	0.4
Less developed regions										
Population	3.7	3.7	2.8	2.5	2.4	2.6	2.5	2.5	2.5	2.7
Enrolment	7.9	7.7	6.8	6.0	4.6	5.2	4.2	5.4		4.6

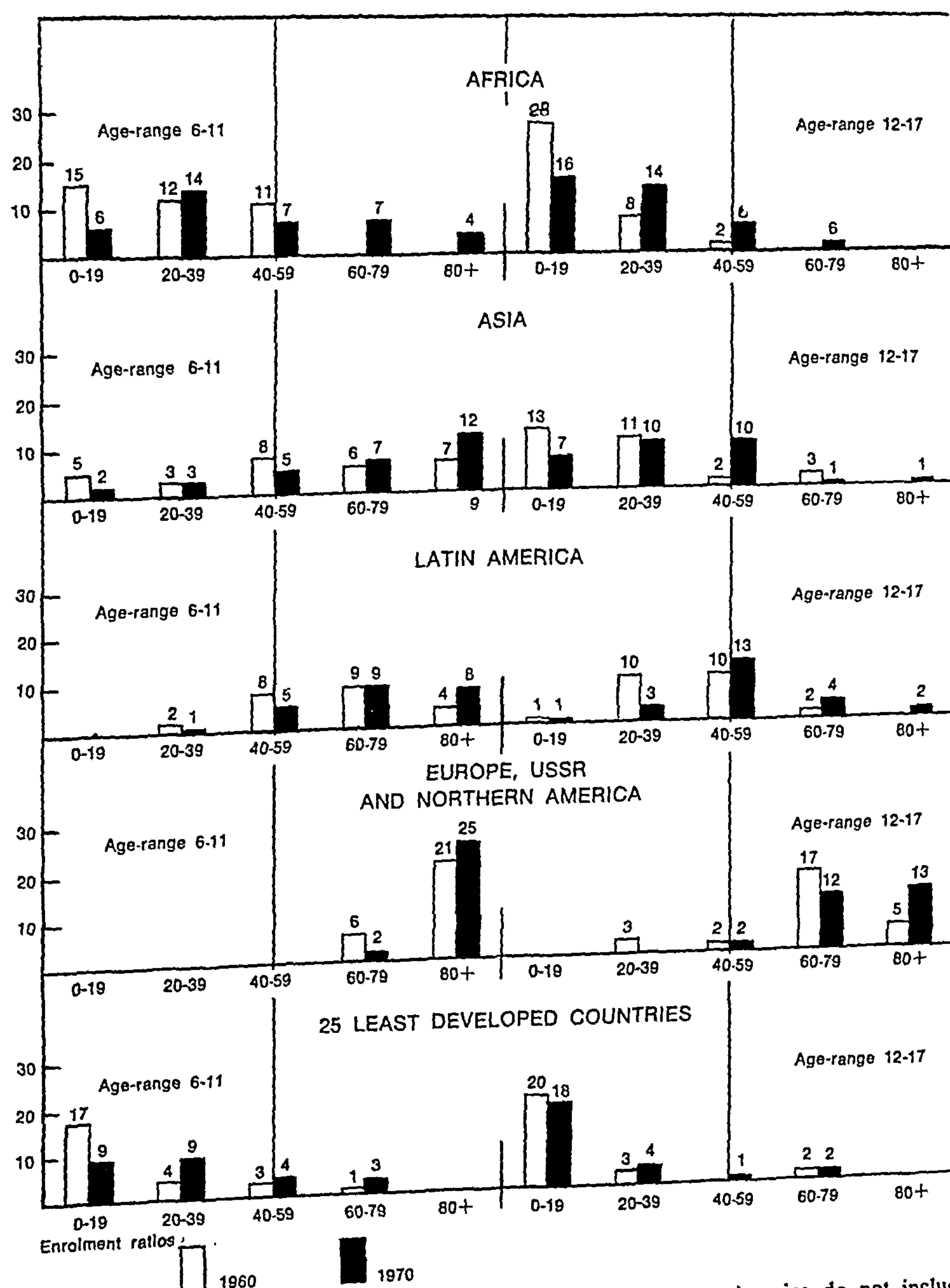
TABLE 3. ENROLMENT RATIOS, BY AGE RANGES, BOTH SEXES

	Age range	Enrolment ratios 1960	1965	1970
More developed regions ..	6-11	91	91	93
	12-17	78	82	86
	18-29	8	12	14
Less developed regions ...	6-11	46	54	60
	12-17	21	27	32
	18-29	2	3	4

21. The figures for all the less developed regions mask large differences between regions and continents. Figure I illustrates the differences in enrolment ratios of the two lowest age ranges in 1960 and 1970 for the various continents, as well as for the 25 countries classified by the United Nations as the least developed among the developing countries. The height of the bars for a given continent shows the number of countries having an enrolment ratio within a given range. The hatched part of the bars illustrates the situation in 1970, while the unhatched part refers to that in 1960.

22. Figure I shows, for example, that in Africa, no country had in 1960 more than 60 per cent of the population aged 6-11 in school; and 27 of the 38 countries of Africa included here had enrolment ratios for

Figure I. Enrolment ratios for 1960 and 1970 for the age ranges 6-11 and 12-17



Note: The charts for Africa, Asia, Latin America, Europe, USSR and Northern America do not include those countries with less than 1 million population in 1970.

this age range lower than 40 per cent. Countries with a population less than 1 million in 1970 are not included In 1970, the situation had changed such that only 20 out of the 38 countries had less than 40 per cent of their population aged 6-11 in school and 11 countries had an enrolment ratio of more than 60 for this age range. Similarly, the right-hand side of the chart shows that in 1960, only two African countries had more than 40 per cent of their population aged 12-17 in school, while 28 had enrolment ratios for this age range lower than 20. In 1970, this latter number of countries was reduced from 28 to 16, while eight countries had enrolment ratios larger than 60

23. The figure shows further that Asia was relatively better off for both age ranges than Africa and that Latin America, in turn, had higher enrolment ratios than Asia The large difference between the above-mentioned three continents, on the one hand, and Europe, USSR and North America, on the other, appears clearly. Thus, in 1970, only two of the 27 countries included in the latter regions had less than 80 per cent of their population aged 6-11 in school and only two had less than 60 per cent of their population aged 12-17 enrolled The chart finally shows that 17 out of the 25 least developed countries had, in 1960, less than 20 per cent of their population aged 6-11 in school and none had an enrolment ratio for this age range of higher than 60 Although there was considerable improvement during the decade, nine countries had still less than 20 per cent enrolled in 1970 For the second range, the improvement during the decade was more modest Thus, the number of countries having less than 20 per cent of their children aged 12-17 in school was only reduced from 20 in 1960 to 18 in 1970

Disparities in enrolment between boys and girls

24 Table 4 gives the percentage that the enrolment of girls constituted of the total enrolment in each age range for the years 1960 and 1970

TABLE 4 GIRLS ENROLLED IN EACH AGE RANGE

(Percentage)

	Year	6-11	12-17	18-29
More developed regions	1960	49	48	36
	1970	49	49	41
Less developed regions	1960	39	34	26
	1970	42	37	32

25 For the more developed regions, the enrolment of girls was at about the same level as for boys both in 1960 and 1970, while the enrolment of girls in the third range still lagged somewhat behind boys in 1970. There was, however, a considerable increase in the proportion of girls in this age range during the decade. It should be noted that as girls, in general, constitute less than 50 per cent of the total number of children in one given age range, a percentage of 49 of the total enrolment will mean an enrolment ratio for girls of at least the same level as for boys

26 Girls of the less developed regions were less represented for all age ranges, but the disparities between the two sexes decreased during the decade

27. The figures mask large differences between regions Thus, all Latin American regions had a percentage of girls equal to that of the more developed regions In South Asia, on the other hand, the girls represented less than 40 per cent of the total enrolment in the age range 6-11 Particularly Middle South Asia had a low representation of girls in all age ranges As concerns Africa, on average, some 41 per cent of the enrolment in the first range were girls in 1970 and three of the five regions had less than 40 per cent girls (see annex III, table 32).

Number of children out-of-school

28 Another way of illustrating the educational disparities between the less developed and the more developed regions is to quantify the number of children who were not enrolled at school This is done in table 5

29 Table 5 shows that the number of children out-of-school in the more developed regions declined for the two lowest age ranges so that in 1970, there were only 8 million children aged 6-11 and 16 million aged 12-17 out-of-school It should be noted that the majority of the 8 million children in the youngest age range were in regions where the normal entrance age for primary education is seven years of age Thus, most of these children were six years old and therefore were not old enough according to national regulations to enter school

TABLE 5 OUT-OF-SCHOOL YOUTH, BY AGE RANGE, BOTH SEXES

(Millions)

	Age range 6-11		Age range 12-17	
	1960	1970	1960	1970
More developed regions	11	8	20	16
Less developed regions*	118	113	136	163
East Asia	0 8	0.3	6	6
South Asia	75	69	87	108
Africa	28	31	29	33
Latin America	14	12	18	19

* Note that the sum of the four continents is not equal to the total of the less developed regions as East Asia includes Japan and Latin America includes Temperate South America, both of which belong to the more developed regions

30 In the less developed regions, the number of children out-of-school aged 6-11 declined slightly during the decade, while the number of children out-of-school aged 12-17 increased considerably. Thus, the more developed regions, due to a relatively slow population growth, managed with their relatively low growth of enrolment not only to keep pace with the popu-

TABLE 6. ENROLMENT RATIOS BY AGE RANGE, BOTH SEXES

	Age range 6-11			Age range 12-17			Age range 18-29		
	1965	1975	1985	1965	1975	1985	1965	1975	1985
More developed regions	91	94	95	82	91	95	12	16	21
Less developed regions[a]	54	62	62	27	35	35	3	5	5
East Asia	96	99	99	69	75	83	5	7	10
South Asia	55	62	64	25	32	32	3	4	4
Africa	40	46	44	22	29	30	1	3	4
Latin America	65	75	75	42	53	55	5	10	11

[a] Note that East Asia includes Japan, and Latin America includes Temperate South America, both of which belong to the more developed regions.

lation, but to reduce the number of young people out-of-school. This is in contrast to the less developed regions, which, although having a much higher growth of enrolment than the more developed regions, only managed to reduce slightly the number of children aged 6-11 out-of-school, while the number out-of-school in the second range increased by 27 million or some 20 per cent. The main reason was high population growth.

31. In regard to the major geographical regions, the number of children aged 6-11 out-of-school was reduced in East Asia, South Asia and Latin America, while Africa had an increase. In the second age range, there was an increase for all regions apart from East Asia. This increase was slight in the case of Latin America, but large for South Asia and Africa.

DISPARITIES IN ENROLMENT RATIOS BETWEEN LESS AND MORE DEVELOPED REGIONS

32. Table 6 shows the enrolment ratios by age-range for the two groups of regions, the more developed regions and the less developed regions, as well as for each of the major geographical regions which comprise the less developed regions. The data are extracted from table 24 (see annex III).

33. Table 6 shows that the more developed regions will maintain their advantage and will by 1985 reach a level of enrolment equivalent to universal education for the two age ranges 6-11 and 12-17 years. The enrolment ratio for the age range 18-29 will increase steadily during the two decades, and about one fifth of the population aged 18-29 years will be enrolled in formal education in 1985.

34. While the increase in enrolment ratios for the less developed regions will have been small but evident during the first decade, not even this level of increase is detectable for the second. As explained above and in annex I, this result depends heavily upon the assumptions on which the projections are based. By 1975, the disparity in enrolment ratios between the more developed regions and the less developed regions will have decreased for the first range only, while over the second decade, the disparities will have increased once more for all three ranges.

35. East Asia will continue to have the highest enrolment ratios for the two lower age ranges. This is not surprising since the region includes Japan, which belongs to the more developed regions. As for the three other regions, Latin America will continue to have the highest enrolment ratios for all age ranges, followed by South Asia. Africa is the continent with the lowest enrolment ratio for all age ranges and the only continent for which the enrolment ratio for the age range 6-11 is projected to decrease between 1975 and 1985. Reference is again made to the explanations of the projection method for the less developed regions given in annex I. Thus, for this age range, the gap in enrolment ratios between Africa and the three other regions will increase during the period 1975-1985.

36. The figures presented in table 6 mask large differences between individual countries, especially in the developing world. In order to show the position of the countries worst off in terms of enrolment ratios, separate projections were made for the countries classified by the United Nations as the 25 least developed countries. These projections are shown in table 7 below, separately for the 8 Asian countries and the 16 African countries belonging to this group (Haiti is the only country out of the 25 not included here).

37. The table shows a fairly common pattern for these two groups, the main difference being a somewhat higher enrolment ratio for the age range 12-17 for the African countries. Thus, if the trends in enrolment and transition coefficients observed during the past

TABLE 7. ENROLMENT RATIOS BY AGE RANGES FOR THE 25 LEAST DEVELOPED COUNTRIES, BOTH SEXES

	Age range	1965	1975	1985
Asia[a] (8 countries)	6-11	17	27	28
	12-17	6	12	15
	18-29	0.8	1.4	2.5
Africa[b] (16 countries)	6-11	19	25	25
	12-17	13	18	19
	18-29	0.9	1.2	2.1

[a] Afghanistan, Bhutan, Laos, Maldives, Nepal, Sikkim, Western Samoa, Yemen.

[b] Botswana, Burundi, Chad, Dahomey, Ethiopia, Guinea, Lesotho, Mali, Malawi, Niger, Rwanda, Somalia, Sudan, Uganda, United Republic of Tanzania, Upper Volta.

decade were to continue to 1985, neither of these two groups would have as much as 30 per cent of their children aged 6-11 in school by the end of the period

38. *It should be noted that the modest increase* projected in enrolment ratios for the less developed regions increased considerably faster than in the more developed regions during the period 1960-1970. This difference in growth also holds true for the future. Annex III shows that while the enrolment during the period 1965-1985 for the more developed regions will increase by 17 per cent for the first range, 23 per cent for the second range and 123 per cent for the third range, the increase will be 100 per cent, 136 per cent and 211 per cent, respectively, for the three age ranges for the less developed regions. The more modest increase in enrolment ratios for the less developed regions, as compared with the more developed regions, despite this difference in enrolment growth is caused by more rapid population growth in the former regions Between 1965 and 1985, the population in the first range will increase by 71 per cent, in the second range by 81 per cent and in the third range by 82 per cent for the less developed regions The corresponding increases for the more developed regions for the same period will be 14 per cent, 7 per cent and 24 per cent, respectively, for the three age ranges (these projections are based on the medium population variant as discussed in paragraphs 47-55).

Universal primary education in the less developed regions

39. *Most* developing countries are committed to universal primary education. Although the enrolment in the age range 6-11 does not include all the children enrolled in primary education, the level of the enrolment ratio for this age range may still be taken as an indication of the extent to which a region will reach, or has already reached, universal primary education. According to table 6, the more developed regions had already reached this level before 1965, the difference between the 91 per cent attained and 100 per cent mainly being due to children aged 6 years who were too young to enter school in regions where the legal age of admission is 7 years.

40. For the less developed regions, on the other hand, only the two regions, Other East Asia and Polynesia and Micronesia, had reached a level close to universal primary education in 1970; and those two regions will be the only two developing regions having *more than 90 per cent of the children aged 6-11 in* school by 1985 (see annex II, table 22) Only two more regions, i e. the Caribbean and Southern Africa, will reach an enrolment ratio of 80 per cent or above for this age range In regard to each of the continents, Latin America will by 1985 have about three quarters of the children in this age range in school, South Asia about two thirds and Africa less than a half. Thus, according to these projections, none of the large developing continents will reach universal primary education by 1985.

41. It is useful to illustrate the magnitude of the increase in enrolment necessary in order to reach universal primary education This is given in table 8. Columns 1 and 2 show the observed average enrolment increase per year for the two five-year periods 1960-1965 and 1965-1970, respectively. Column 3 shows the enrolment increase per year required during the period 1970-1985 in order to enrol all children aged 6-11 by 1985 while the last column gives the average enrolment increase per year implied by the projections.

42 The table shows that, on the average, the less developed regions increased their enrolment each year with about 7 4 million pupils during the period 1960-1965 and with about 7 0 million during the period 1965-1970 Only Latin America increased the enrolment faster during the last part of the decade than during the first five years The third column of the table shows that if all children aged 6-11 were to be enrolled by 1985, this would mean an increase of 17 8 million pupils per year, that is more than twice the annual increase during the period 1960-1965. For Africa, this would mean an increase four times that of the period 1960-1965. The last column of the table shows that the annual increase in enrolment implied by the projections is of the same magnitude as observed during the period 1960-1970

43. The projections [illegible] [illegible] [illegible] [illegible] [illegible] large majority of [illegible] [illegible] [illegible] [illegible] [illegible] universal primary [illegible] [illegible] [illegible]. Thus [illegible] [illegible] to reach the regional [illegible] [illegible] [illegible] [illegible] [illegible] down by various [illegible] [illegible] [illegible] [illegible] UNESCO during [illegible] [illegible] [illegible], a [illegible] [illegible] even greater efforts [illegible] [illegible] [illegible] [illegible]

Table 8. Average annual increase in number of [illegible]

(Millions)

	Average annual enrolment increase 1960-1965	[illegible]	[illegible]	[illegible]
Less developed regions	7 4	[illegible]	[illegible]	[illegible]
South Asia	4.9	[illegible]	[illegible]	[illegible]
Africa	1.1	[illegible]	[illegible]	[illegible]
Latin America	1.1	[illegible]	[illegible]	

in the conservative practices of educational systems would appear to be required for many developing countries.

44. During the past decade, several regional ministerial conferences on the development of education were convened. These conferences established, among other things, quantitative targets for the expansion of primary education. These targets were in terms of adjusted enrolment ratios, calculated by dividing total enrolment in primary education regardless of age by the population of the age range who according to national regulations should be enrolled at this level. For Asia, the ratio was obtained by dividing total enrolment in grades 1-5 by the population aged 6-10. For Africa and Latin America, the enrolment in primary education was divided by the first-level school-age population obtained for each country by multiplying the 5-14 years old population by the proportion composed of the duration in years of primary education divided by 10. This was done since population data at that time were available only by five-year age ranges. The enrolment ratios presented in this paper are, therefore, not directly comparable to those used for the conferences. Because of over-aged children in the less developed regions due to late entries and repetition, the adjusted enrolment ratios will, in general, be higher than the ratio used here as this latter includes only the pupils falling within the relevant age range. But although the ratios used by the conferences are not directly comparable to the ratios presented in this paper, the differences between the targets and the projections are large enough to suggest that the targets will not be reached.

45. The target agreed upon at the Regional Meeting of Representatives of Asian Member States on Primary and Compulsory Education, held at Karachi from 28 December 1959 to 9 January 1960, was to achieve universal primary education by 1980.[1] In 1970, the enrolment ratio for Asia for the age range 6-11 was about 65 per cent, and it is projected to reach 67 per cent by 1985. Similarly, the Conference of African States on the Development of Education in Africa, which met at Addis Ababa from 15 to 25 May 1961,[2] also agreed on a target of 100 per cent enrolment by 1980, with an intermediary stage of 71 per cent in 1970. It has been estimated that the enrolment ratio for the age range 6-11 was 44 per cent in Africa in 1970 and will remain at this level in 1985. The Conference on Education and Economic and Social Development in Latin America, which met at Santiago, Chile, from 5 to 19 March 1962, called on Latin American countries to achieve 100 per cent enrolment in primary education by 1970.[3] Although the region, Temperate South America, had reached an enrolment ratio of 92 per cent for the age range 6-11 in 1970 and thus almost fulfilled this goal, none of the three other regions had reached an enrolment ratio of 80 per cent. By 1985, the projected enrolment ratio for this age range is 75 per cent for All Latin America. It is particularly the most populous region, Tropical South America, which is lagging behind. Lastly, the Conference of Ministers of Education and Ministers Responsible for Economic Planning in the Arab States which met at Tripoli, Libya, from 9 to 14 April 1966, confirmed their intention of reaching universal primary education by 1980.[4] Projections have not been presented separately for the Arab States in this paper. However, Northern Africa, which in 1970 contained about 70 per cent of the Arab population, had an enrolment ratio of 52 per cent for the age range 6-11 in 1970, the same as in 1965, and this ratio is projected to decline to about 48 per cent in 1985.

46. The conditional nature of the projections presented in this paper should once again be emphasized. The purpose is merely to quantify the implications for 1985 of continuing the trends in enrolment observed during the past decade. The conclusion to be drawn from the foregoing discussion is that if these trends were to continue, none of the above targets would be reached by 1985.

Effect of pressure of population on enrolment ratios in the less developed regions

47. The high growth of the school-age population in the developing regions leading to a rapidly increasing demand for education is caused by rapid declining child mortality and continued high birth rates. It is this effect of increased demand for education due to population growth which is considered in this section. A later section deals with a further consequence, which is the higher burden imposed on the labour force by a larger dependent population and the large proportion of the educated labour force required as teachers.

48. The projections presented in this paper are based upon the "medium" population variant as established by the Population Division of the United Nations. This variant is considered to be the most plausible and is based upon two combined hypotheses concerning mortality levels and the sequence of declining fertility. The three other variants are:

(*a*) The "low" variant (i.e., relatively high mortality level and early decline in fertility);

[1] This became known as the *Karachi Plan*, a Working Plan for the Provision of Universal, Compulsory and Free Primary Education in Asia (1960-1980). The text of the *Karachi Plan* is contained in *UNESCO Education Studies and Documents* No. 41 (UNESCO publication, Sales No. ED.60.XII.41A).

[2] United Nations Educational, Scientific and Cultural Organization, "Final report of the Conference of African States on the Development of Education in Africa", Addis Ababa, 15-25 May 1961 (UNESCO/ED/181), chap. V, recommendation C, operative para. 2 (c).

[3] United Nations Economic Commission for Latin America, "Report of the Conference on Education and Economic and Social Development in Latin America" (ST/ECLA/CONF.10/L.37), part III.A.II, recommendation I.

[4] United Nations Educational, Scientific and Cultural Organization, "Final report of the Conference of Ministers of Education and Ministers Responsible for Economic Planning in the Arab States", Tripoli (Libya), 9-14 April 1966 (UNESCO/ED/223), chap. III, operative para. 6 (b).

(*b*) The "high" variant (i e., relatively low mortality and high fertility levels);

(*c*) The "constant" variant (i e., constant mortality and fertility levels).

49. These three latter variants are only available for the less developed regions The analysis is limited to the age range 6-11, as the children aged 15 years and over in 1985 were already born in 1970. Hence, their numbers in 1985 will not be influenced by different assumptions concerning fertility and mortality The calculations made for the enrolment ratios of the age range 12-17 showed only slight variations between population variants as the children, aged, respectively, 15, 16 and 17 years were already born in 1970. The influence of the different variants is illustrated in tw different ways·

(*a*) By comparing the enrolment ratios to whic each variant leads given the enrolment projections;

(*b*) By comparing the increase in enrolments r quired if the enrolment ratio of 1970 were to t maintained.

Enrolment in 1985 by population variant

50 Table 9 presents the enrolment ratios for 197 and for 1985 for the age range 6-11 according to th four population variants for the total less develope regions and for the three continents It should be note that Latin America includes Temperate South Americ which belongs to the more developed regions

TABLE 9. ENROLMENT RATIO IN 1985 FOR THE AGE RANGE 6-11, BY POPULATION VARIANT, BOTH SEXES

	Enrolment ratio for the first range 1970	Enrolment ratio in 1985 for the first range by population variant			
		Medium	Low	High	Constant
Less developed regions	60	62	68	58	59
South Asia	61	64	71	60	60
Africa	44	44	47	42	44
Latin America	72	74	79	69	68

51 The considerable difference in enrolment ratios between the high and the low variant appears clearly in the table, while the constant variant in general falls very close to the high variant. Thus, on average, for the less developed regions, the high variant gives an enrolment ratio of 58 per cent as compared to 68 per cent for the low variant. For South Asia and Latin America, the difference is of the same magnitude, while for Africa it is considerably less. This smaller difference for Africa appears because the population is projected to grow rapidly for all four variants The population aged 6-11 is projected to grow faster for Africa than for the other continents.

Necessary increase in enrolment between 1970 and 1985 to keep pace with population growth

52 The increase in enrolment in the first range between 1970 and 1985 necessary to keep pace with the population growth will be quantified. The enrolment of this age range in 1985 necessary to maintain the 1970 enrolment ratio is found by multiplying the 1970 enrolment ratio by the 1985 population of relevant ages. The necessary increase in enrolment during the period, expressed as a percentage of the 1970 enrolment, is given in table 10 Although only the ratio for the medium variant is available for the more developed regions, it is included for the purpose of comparison.

53 Table 10 shows that under the "medium" variant, the less developed regions will have to increase their enrolment by 54 per cent in order to maintain their 1970 enrolment ratio, which was 60 per cent for this age range This is about five times more than th increase necessary for the more developed regions t maintain their 1970 enrolment ratio of 93 per cen For Africa, the difference is even greater

54 For all conditions but that of the constar variant, Africa would be required to make the large proportionate increase in enrolments Even the lo variant would require a 53 per cent increase by 198 merely to maintain the 1970 enrolment ratio The fa that the variants reflect different assumptions abo population growth in each region is most evident f Latin America, where even the high variant leads to lower required increase in enrolments than does th constant variant.

Projected enrolment increase due to population growt

55. If the medium variant is assumed, use can b made of the data calculated above to estimate th proportion of the increase in enrolments in the ag

TABLE 10 PERCENTAGE INCREASE IN ENROLMENT NECESSAR BETWEEN 1970 AND 1985 IN ORDER TO MAINTAIN THE 197 ENROLMENT RATIO, AGE RANGE 6-11

	Percentage increase in enrolment betwe 1970 and 1985 by population variant			
	Medium	Low	High	Consta
More developed regions	11			
Less developed regions	54	41	65	64
South Asia	54	40	66	66
Africa	60	53	69	61
Latin America	52	42	62	65

range 6-11 between 1970 and 1985 which can be accounted for by population growth. This can be done by expressing the enrolment increase that was necessary to maintain the 1970 enrolment ratio, as a percentage of the total enrolment increase projected for the period 1970-1985. The results of this operation show that for all the less developed regions, some 91 per cent of the projected enrolment increase between 1970 and 1985 is due to population increase. The corresponding figures for South Asia and Latin America were 87 per cent and 92 per cent, respectively. In the case of Africa, the total increase in enrolment during this period can be attributed to population increase, as the enrolment ratio is projected to be the same in 1985 as in 1970. Thus, although the less developed regions will increase their enrolment in the first range during this 15 year period by some 60 per cent, as compared with some 12 per cent for the more developed regions, because of rapid population growth, almost none of this increase can be used to improve their enrolment ratios.

Number of children out-of-school

56. Table 11 shows a decline in the number of children not enrolled in school for the more developed regions in the lower two age ranges. Thus, the number of children aged 12-17 years will decrease from 20 million in 1965 to only 6 million in 1985. The anomaly of a higher figure in the first than in the second range arises because in some countries the entrance age for primary education is 7 years. Thus, most of the 7 million children aged 6-11 out-of-school are 6 years old and not old enough according to national regulations to enter school.

57. For the less developed regions, the number of children out-of-school will increase considerably and will by 1985 constitute 165 million in the age range 6-11 and 240 million in the age range 12-17. Taking the age range 6-17 years in the less developed regions, although the percentage out-of-school will decline from 58 per cent in 1965 to 50 per cent in 1985, the absolute number of children out-of-school will increase from 264 million in 1965 to 405 million in 1985, i.e., by some 53 per cent.

58. In regard to the four major developing regions, only East Asia will have a decline in the number of children out-of-school. Relatively speaking, the increas is largest in Africa where the number of children ou of-school will increase between 1965 and 1985 b 69 per cent and 61 per cent, respectively, for the fir and second ranges. In absolute terms, the increase i largest in South Asia, which in 1985 will have abou 59 per cent of the total number of children aged 6-1 out-of-school in the less developed regions.

59. This very large number of out-of-school yout includes three main categories:

(*a*) Those who have not at any time enrolled in th first level;

(*b*) Those who have enrolled in the first level, bu have dropped out before completing that level;

(*c*) Those who have completed at least the first leve of education, but who have not enrolled in or not completed any subsequent level.

60. In addition, some of the out-of-school youth may have completed secondary education. The division of out-of-school youth into three categories cannot be accomplished without access to data which shows the distribution of ages within grades for the first level and the distribution of ages for at least first enrolment and graduation for subsequent levels. Available data is too sparse to be of use to a world population survey, yet without it, the nature and magnitude of the provision required to reduce the numbers of youth not in school cannot be assessed (an idea of the magnitude of each group is however given below for Africa). The problems presented in the three categories can only be sketched here.

61. In the first category are children for whom opportunities to enter school are not available; either there are not enough places in schools within their reach or the families cannot afford to send them to school. There are also children for whom there are places but whose parents are alienated from the school. In the second category are children who are rejected by the school as failures, who are withdrawn by the parents or who abscond, or who are disillusioned by school and drift from absence into drop-out. In the third category are children who regard basic literacy and numeracy as sufficient school-based competences and perhaps as conferring a right to gainful employment, and still others for whom places in second-level

TABLE 11. OUT-OF-SCHOOL YOUTH, BOTH SEXES

(Millions)

	Age range 6-11			Age range 12-17		
	1965	*1975*	*1985*	*1965*	*1975*	*1985*
More developed regions ...	10	7	7	20	11	6
Less developed regions	114	128	165	150	177	240
East Asia	0.8	0.1	0.1	6	5	4
South Asia	71	80	98	98	116	162
Africa	29	34	49	31	37	50
Latin America.........	14	13	17	19	21	26

education are not available. The problems for the out-of-school youth in this category are particularly serious in countries where there is a lack of employment possibilities.

62. The data given in annex II (table 23) for Africa, although not sufficient to classify the out-of-school youth into these three groups, give an idea of what happened to the two cohorts beginning grade 1 in 1960 and 1967, respectively. The classification is somewhat different from the one outlined above as the children were grouped into those who had never been to school, those who had been to school but who dropped out before reaching grade 4, and those reaching grade 4 or beyond. The calculations given in annex II indicate that around 47 per cent of the children aged 6 years old in 1960 were never enrolled at school, 18 per cent dropped out before reaching grade 4 and 35 per cent reached grade 4 or beyond Similarly, for the children aged 6 years in 1967, 45 per cent were never enrolled at school, 18 per cent dropped out before reaching grade 4 and 37 per cent reached grade 4 or beyond As the data on which these calculations were based are approximative, the results should only be taken as an indication of what happened to the two cohorts.

Increase in the enrolment and reduction in the number of illiterate children in the less developed regions

63. The figures given in table 6 indicate that by 1985, less than two thirds of the children aged 6-11 and slightly more than one third of the children aged 12-17 will be enrolled in schools in the less developed regions. The performance of an educational system should, however, be measured in terms of the quantity as well as the quality of output and not in terms of quantity of input only, e g., by counting the number of pupils enrolled. The notion of output from any cycle of the school system is difficult to define in meaningful, measurable terms However, for primary education, one might argue that one of the main objectives, possibly the main objective of the first few grades, is to make the pupils literate. For lack of a better measure (and with the aim of illustrating the seriousness of the situation for most developing regions) the percentage of the pupils enrolled in grade 1 in 1960 and 1967, respectively, who ultimately reached grade 4 was calculated. In addition, for the 1967 cohort, the percentage of the pupils reaching grades 2 and 3, respectively, was also calculated to illustrate at which grade drop-out takes place

64. Grade 4 was chosen as the last grade for which calculations were made as it is often assumed that a pupil who does not complete grade 4 of primary education is at risk of eventually relapsing into illiteracy. Unfortunately, the data available only permitted the calculation of the percentage of children who in given years are enrolled in grade 1 who will reach grade 4 and not the percentage of those who will complete this grade Evidently, those who reach grade 4 may have spent more than 4 years at school due to repetition. A further problem is that the data available do not permit a fair estimation in statistical terms of the school history for a given cohort on a regional basis as the data on repetition and drop-out are not complete enough, particularly for the cohort entering school in 1960 Thus, the calculations were based on the apparent cohort method which consists of comparing the number of pupils in grade 1 in a given year with the enrolment in successive grades during successive years and assuming that the decrease from one grade to the next corresponds to drop-out The figures presented here should therefore be interpreted with caution, both because the method used gives very approximate estimates for education survival and because they hide large variations between countries and regions However, the reconstruction of cohorts for some regions of which repetition and drop-out data were available for years close to 1970 confirms the magnitude of the results presented here

65 The results of the above calculations are given separately for each less developed region (with the exception of Southern Africa) in annex II (table 27) and are summarized below in table 12

66. Columns 1 and 4 of table 12 show that only about 50 per cent of the pupils enrolled in grade 1 during the past decade in the less developed regions reached grade 4 The figure was considerably lower for Latin America, although there was some improvement during the seven years covered here, and considerably higher for Africa, where about two thirds of the pupils enrolled in grade 1 reached grade 4 For East Asia, which includes the two regions, Japan and Other East

TABLE 12. APPROXIMATE EDUCATION SURVIVAL RATES FOR 1960 AND 1967 COHORTS, BOTH SEXES

	Percentage of enrolment in grade 1 in 1960 that reached grade 4	*Percentage of enrolment in grade 1 in 1967 that reached*		
		Grade 2	*Grade 3*	*Grade 4*
Less developed regions	47	71	63	54
East Asia	95	98	97	97
South Asia	48	72	63	53
Africa	66	81	74	67
Latin America	34	59	50	42

Asia, the drop-out was negligible. The over-all figures shown in table 12 obviously mask large regional differences (see annex II, table 22, for more details).

67. Columns 2, 3 and 4 of table 12 give estimated survival to grades 2, 3 and 4 for the 1967 cohort. The table implies that about 29 per cent of the pupils in the less developed regions dropped out before grade 2, 37 per cent before grade 3 and 46 per cent before grade 4. There were large differences between the major regions. Thus, for Latin America, 41 per cent of the children enrolled in grade 1 in 1967 did not reach grade 2. For Africa, the corresponding figure was 19 per cent and thus considerably lower.

68. The high drop-out rates shown above cast doubt on the extent to which the educational systems in some of the less developed regions, despite their rapid growth of enrolment during the past decade, were able to attack successfully the problem of reducing illiteracy. (Again, it should be noted that this is a very aggregated picture and large differences exist between individual countries.) The high drop-out rates also lead one to question the significance of a high enrolment ratio if a large proportion of the children drop out before even becoming literate. For example, although in 1970 Latin America had enrolment ratios that were considerably higher than those of Africa, as concerns "output", the difference in relative terms between those two continents might not be so large. As an illustration, assume that two regions in a given year both had 60 per cent of their children aged 6-11 enrolled at school. In region *A*, this enrolment ratio might have been obtained by enrolling each year 60 per cent of the children aged 6 years and keeping them all at school throughout a six-year period. In region *B*, the same enrolment ratio might have been obtained by enrolling all children aged 6, but due to high regular drop-out maintaining only 20 per cent at school by the end of the six-year period. If the enrolment ratios are used as proxy for the level of output from the six-year system, in relative terms the outputs are equal for the two regions. However, if the number of those who successfully complete six years of education is used, the output from region *A* is three times that of region *B*.

69. Unfortunately, the available data do not permit a thorough analysis of this question. The problem has however been illustrated for four out of the five African regions in annex II, table 23. The results presented in that table show that for these four regions taken together, the sum of the number of children aged 6 years in 1967 who were either not enrolled at school at all or who dropped out before reaching grade 4 was some 16 per cent larger that the corresponding sum for the 1960 cohort. Note that this happened during the period when the expansion of enrolment in Africa was most rapid during the past decade (the enrolment ratio for the age range 6-11 increased from 33 per cent in 1960 to 41 per cent in 1967). There was however a slight improvement in relative terms, as the percentage of children from this cohort who reached grade 4 increased from 35 per cent in 1960 to 37 per cent in 1967.

70. Furthermore, illiteracy in the population as a whole obviously decreased as new and more literate cohorts entered the adult population. Also, for a study of the development of the level of illiteracy for the total population, it would be necessary to take into account literacy programmes for adults.

71. The data and projections available are not sufficient to allow one to extend the quantitative analysis to include the future development of illiteracy. It is obvious that a drastic improvement in the holding power of the educational systems in Africa and South Asia would help the literacy situation considerably, but this alone may not be enough to reduce the number of illiterate children by 1985. For Latin America, there is obviously more to gain by increasing the holding power of the system. The increase projected in the enrolment ratios for 1985 is too modest to make sufficient headway against population growth to win the battle against illiteracy in Africa and South Asia.

DISPARITIES IN ENROLMENT BETWEEN BOYS AND GIRLS

72. This topic is studied by examining the percentage that the enrolment of girls constitutes of the total enrolment in each of the three age ranges. It should be recalled that the projections were made separately for each sex and that the totals presented elsewhere in this paper were obtained by aggregation.

73. Table 13 shows that, for the more developed regions, the representation of girls in the two lower age ranges will be about the same as for boys throughout the period. Girls will, however, continue to be less represented than boys in the third range, although their enrolment will grow faster than that of boys.

74. This is in contrast to the less developed regions, where boys in 1985 will constitute around 60 per cent of the enrolment in the two youngest age ranges and about 64 per cent of the enrolment in the third range. There will, however, be a steady increase in the representation of girls throughout the period, particularly in the third range.

75. Table 32 (see annex III) shows that if the continents are taken separately, Latin America has a representation of girls very similar to that of the more developed regions. The enrolment of girls is particularly

TABLE 13. PERCENTAGE OF GIRLS ENROLLED, BY AGE RANGE

	Age range	*1965*	*1975*	*1985*
More developed regions . .	6-11	49	49	49
	12-17	48	49	49
	18-29	39	42	43
Less developed regions . . .	6-11	41	42	43
	12-17	36	38	40
	18-29	29	33	36

low in Middle South Asia and South-West Asia, as well as in Western, Middle and Northern Africa

EXPECTANCY OF SURVIVAL IN THE EDUCATIONAL SYSTEM

76. This question can be illustrated by studying the changes over time of the education survival rates. These rates give, for example, the percentage of the pupils aged 6-11 years in a given year who, six years later, still remain enrolled at school. Table 14 shows that, for the more developed regions, 93 per cent of the boys and 91 per cent of the girls who were enrolled in 1960 remained at school six years later By contrast, the chances of a child in the less developed regions, enrolled in the first range, still being enrolled six years later will only be slightly better for girls in 1980 than it was in 1960, and slightly worse for boys, who will continue to have a higher chance than girls of remaining enrolled in the second range. Thus, the difference between the less developed regions and the more developed regions in the chances of a child in the first range continuing to be enrolled in the second range will be larger in 1980 than in 1960. Similarly, the chances of the pupils in the second range being enrolled in the third range six years later can be examined as is done in table 15.

TABLE 14 PERCENTAGE OF PUPILS AGED 6-11 IN 1960, 1970 AND 1980, RESPECTIVELY, WHO REMAIN IN SCHOOL SIX YEARS LATER

	Sex	*1960*	*1970*	*1980*
More developed regions	Boys	93	99	99
	Girls	91	98	99
Less developed regions	Boys	62	60	60
	Girls	52	54	54

TABLE 15 PERCENTAGE OF PUPILS AGED 12-17 IN 1960, 1970 AND 1980, RESPECTIVELY, WHO REMAIN IN SCHOOL SIX YEARS LATER

	Sex	*1960*	*1970*	*1980*
More developed regions	Boys	37	41	52
	Girls	26	31	41
Less developed regions	Boys	28	28	29
	Girls	23	24	26

77 In the more developed regions, children in the second range will have increasingly better chances of third range enrolment until, by 1980, one in every two boys will be enrolled in the third range, and two in every five girls. For the less developed regions, the levels as well as the rate of increase in the survival rates are much lower than in the more developed regions Thus, the difference between the less developed regions and the more developed regions in the chances of a child in the second range being enrolled six years later in the third range will be larger in 1980 than in 1960.

78 Table 15 shows that the difference between boys and girls as concerns the chances of reaching third-range enrolment is higher in the more developed regions than in the less developed regions In interpreting these rates, one should, however, keep in mind that in the less developed regions, a larger part of the enrolment in the third range belongs to secondary education than is the case in the more developed regions, where the large majority belongs to higher education Furthermore, the education survival rates refer to the children already enrolled Since the enrolment ratios are practically the same for both sexes in the first and second range for the more developed regions, while the enrolment ratios for boys are much higher than for girls in the less developed regions, the difference in the number of girls achieving third-range enrolment and the number of boys achieving third-level enrolment is lower in the more developed regions than in the less developed regions This is shown in table 13. The problem is further illustrated by table 16, which gives the chances for a child in the first range (whether enrolled at school or not) to be enrolled in the third age range 12 years later.

TABLE 16 PERCENTAGE OF CHILDREN (PUPILS OR NOT) AGED 6-11 IN 1960 AND 1975, RESPECTIVELY, WHO REMAIN IN SCHOOL 12 YEARS LATER

	Sex	*Chances of a child aged 6 11 in 1960 to be in school in 1972*	*Chances of a child aged 6-11 in 1975 to be in school in 1987*
More developed regions	Boys	30	49
	Girls	22	39
Less developed regions	Boys	9	11
	Girls	5	7

79. In statistical terms, this is the probability that a child will both be enrolled at school in the first range and remain enrolled until the third range The table shows clearly that now the gap between the two regions has been enlarged considerably. The chances of a boy in the first range, in the more developed regions, in 1960 being both enrolled at school and remaining in the system until the third range, were more than three times higher than in the less developed regions. For a boy in the first range in 1975, the corresponding chances were more than four times higher in the more developed regions than in the less developed regions. For girls the difference was even larger. Thus, in 1960, chances were between four and five times higher in the more developed regions, and in 1975, between five and six times higher Hence the gap will, for both sexes, increase between the two regional groups

NUMBER OF PRIMARY-SCHOOL TEACHERS REQUIRED TO SUSTAIN THE PROJECTED INCREASE IN ENROLMENT

80. Even the modest increase in enrolment ratios projected for the less developed [illegible] for [illegible] ll,

as earlier sections have shown, imply a continual, heavy increase in enrolment. The enrolment increase implies in turn a corresponding increase in the number of teachers needed, if the quality of education is not to deteriorate. An attempt is made below to assess roughly the implications of projected enrolments for teacher supply. The lack of comparable data compels restriction of the analysis to teachers in primary education. However, the enrolment in primary education constituted in 1970 some 78 per cent of the total enrolment at all levels in the less developed regions and some 63 per cent of the total enrolment in the more developed regions. Teachers' salaries are by far the most important recurrent cost item at this level, accounting for about 80-90 per cent of the total recurrent costs in most countries.

81. The convenience of dealing with primary education instead of enrolment in the age range 6-11 arises from the fact that the data available on teachers refer to the level of education at which they teach rather than to the age range taught. In general, the enrolment in primary education is larger than the enrolment in the age range 6-11. In 1970, the total enrolment in the age range 6-11 (regardless of level) was some 84 per cent of the enrolment in primary education for the less developed regions and 73.5 per cent for the more developed regions. This percentage remained fairly stable during the period 1960-1970. The estimations for enrolment in primary education in 1975 and 1985 are based on projections of this percentage using the data for the past decade. This procedure, together with the projections for first-range enrolment presented earlier, gives, for the less developed regions, 242 million pupils in 1975 and 316 million pupils in 1985 in primary education. Similarly, for the more developed regions, the primary enrolment in 1975 is estimated to be 147 million and in 1985, 169 million.

82. The pupil/teacher ratios in primary education in 1970 were, on average, 35 for the less developed regions and 25 for the more developed regions. For less developed regions, the ratio was the same in 1965, while for the more developed regions, it was then 27. Table 17 gives the teacher requirements for primary education in 1975 and 1985 if the pupil/teacher ratios were to remain fixed as in 1970.

83. In the more developed regions, the required increase in teachers between 1965 and 1985 is only 26 per cent, that is about 1.2 per cent per annum. If the pupil/teacher ratio were to be decreased further, the increase in teacher requirements would, of course, be higher. For the less developed regions, the required increase between 1965 and 1985 is 91 per cent in order to maintain their pupil/teacher ratio of 35 in 1970. If, however, the less developed regions should at the same time want to increase their teaching standards to reach the pupil/teacher ratio of the more developed regions in 1970, the total required increase in the number of teachers between 1965 and 1985 would be 7.9 million, that is some 168 per cent. This corresponds to an annual growth rate of 5.1 per cent.

84. The increase necessary in enrolment in order to reach universal primary education by 1985 was discussed in paragraphs 39-46. If the less developed regions were to reach this target and maintain their 1970 pupil/teacher ratio, 12.5 million teachers would be needed, that is an annual growth rate between 1965 and 1985 of 5.0 per cent. As shown above, this is about the same as the growth necessary for the less developed regions if they were to increase their enrolment in primary education and at the same time want to decrease their pupil/teacher ratio from 35 to 25. This is an interesting example of the choice open to the less developed regions in terms of the use of teachers between, on the one hand, a rapid expansion of enrolment, without improving the quality of education and, on the other hand, a less rapid increase of enrolment combined with raising the teaching standards.

85. In order to put the figures in table 17 in perspective, it is interesting to note that the number of primary school teachers for the less developed regions grew at an annual rate of 4.0 per cent for the period 1960-1965 and at a rate of 4.6 per cent during the period 1965-1970. Thus, if this growth can be maintained in the future, it will be more than sufficient to provide for the projected enrolment if the 1970 pupil/teacher ratio were to be maintained. As concerns the more developed regions, the number of primary school teachers increased at an annual rate of 3.4 per cent during the period 1960-1965 and 1.7 per cent during the period 1965-1970. Thus, the more developed regions can maintain universal primary education as well as the 1970 pupil/teacher ratio even by lowering further their growth rate of the stock of teachers.

86. In the educational expansion process, the teacher training facilities are of crucial importance. The

TABLE 17. TEACHER REQUIREMENTS IN PRIMARY EDUCATION

	Pupil/teacher ratio	*Number of teachers required (millions)*			*Percentage increase 1965-1985*	*Average annual growth rate*
		1965	*1975*	*1985*		
More developed regions .	25, as in more developed regions in 1970	5.4[a]	5.9	6.8	26	1.2
Less developed regions . .	35, as in less developed regions in 1970	4.7[a]	6.9	9.0	91	3.3
	Gradual change from 35 to 25 by 1985	—	—	12.6	168	5.1

[a] Figures estimated on the basis of the observed pupil/teacher ratios for 1965.

expansion of these facilities has to occur some years before the changes in enrolment, in order to have enough teacher graduates available when the need arises. The projected expansion of enrolment therefore hinges on an adequate supply of places in teachers' colleges and other institutions supplying potential teachers.

87 The output of graduates from such institutions must replace normal loss of teachers due to mortality, retirement, job change etc., as well as satisfy the needs for new teachers due to increased enrolment and higher quality (improvement in pupil/teacher ratios) The magnitude of the normal loss will depend upon a number of things, such as the age distribution of the teachers, the normal retirement age and their job opportunities in other occupations Normally, the loss can be estimated to be of the order of 3-5 per cent of the total staff, and, for the purpose of illustration, it is assumed that it will be 4 per cent for both groups of regions Under this assumption, the required output of new teachers in order to replace normal teacher loss and to meet increased enrolment will have to be of the order of 5.2 per cent of the stock of teachers during the period 1970-1985 for the more developed regions to maintain the 1970 pupil/teacher ratio The corresponding requirement for the less developed regions is 7 3 per cent of the stock of teachers to maintain their 1970 pupil/teacher ratio and 9 1 per cent if these regions were to reduce the number of pupils per teacher to 25 by 1985.

88 This analysis illustrates how sensitive the required output of new teachers is to the growth of enrolment and to improvement in the pupil/teacher ratio One factor that might increase the normal loss for the less developed regions is that a large number of the present teachers do not possess formal teaching qualifications. If those should be replaced by qualified teachers, the requirement for new teachers in less developed regions would be still larger than indicated above. Furthermore, in some areas, notably Africa, a considerable fraction of the teachers, particularly in secondary education, come from more developed regions. If those should be replaced, still more new teachers would be needed.

THE "BURDEN" ON THE LABOUR FORCE TO SUSTAI THE PROJECTED ENROLMENT

89. A rough indication of the relative cost of en rolling a certain number of pupils, and thereby of th ability of a country or region to carry through a give enrolment increase, may be obtained by comparing th costs of the programme with the projected gross na tional product Unfortunately, owing to the paucity o data on capital costs and teachers' salaries and becaus of the lack of projections in this area, such an approac is not feasible For international comparisons on regional basis, an approach of this nature would als suffer from problems in connexion with converting th monetary data for each country within a region int one common currency.

90 Despite this lack of data and projections i monetary terms, it is possible to shed some light o the implications in real terms of the enrolment pro jected This can be done by combining the enrolmen projections of this paper with the data and projection of population provided by the Population Division o the United Nations and labour force projections mad by the International Labour Organisation These dat and projections are used to illustrate how the "burden" on the labour force (expressed as the number of pupil per 1,000 members of the labour force) may chang until 1985 because of increases in enrolment, change in the labour force participation rates and changes i the age structure of the population This is done in table 18. Columns 1-3 give the number of pupils aged 6-11 per 1,000 persons in the labour force, while columns 4-6 give the total number of pupils in all age ranges per 1,000 persons in the labour force.

91. Column 1 of table 18 shows that the more developed and the less developed regions had, in 1965, about the same number of pupils aged 6-11 per 1,000 persons in the labour force in spite of the fact that the less developed regions had only 54 per cent of their children in this age range in school, while the more developed regions had an enrolment ratio of 91 per cent. Columns 2 and 3 of the table show further that while the "burden" on the labour force is projected to decline sightly for the more developed regions, it

TABLE 18. NUMBER OF PUPILS PER 1,000 PERSONS IN THE LABOUR FORCE

	Number of pupils aged 6-11 per 1,000 persons in the labour force			*Total number of pupils per 1,000 persons in the labour force*		
	1965	*1975*	*1985*	*1965*	*1975*	*1985*
More developed regions	229	210	219	475	487	504
Less developed regions	229	277	289	336	430	456
South Asia	222	274	288	318	406	432
Africa	161	197	208	243	314	344
Latin America	327	388	395	531	681	714

SOURCE. Labour force estimations and projections taken from International Labour Organisation, "Labour force projections 1965-1985" (Geneva, 1971), part I-V

will increase sharply for the less developed regions, particularly between 1965 and 1975, and will in 1985 be some 25 per cent higher than in 1965 or some 31 per cent higher than the "burden" of the more developed regions in 1985.

92. Concerning the three continents individually, South Asia will follow closely the pattern of the total for the less developed regions, while Latin America had in 1965 and will continue to have until 1985, a "burden" considerably higher than for any other continent. In 1985, the enrolment in the age range 6-11 per 1,000 persons in the labour force will be 1.8 times that of the more developed regions. For Africa, the "burden" on the labour force was in 1965 about 70 per cent of that of the more developed regions, while it will increase to about 95 per cent in 1985. Despite this fact, the projected enrolment ratio for Africa in 1985 is only 44 per cent as compared with 95 per cent for the more developed regions.

93. The last three columns of table 18 extend the analysis to include the "burden" on the labour force of the total number of pupils in all age ranges. The table shows that measured in this way both the more developed and the less developed regions will increase their "burden" on the labour force between 1965 and 1985. The increase will, however, be six times larger for the less developed regions than for the more developed regions, as the former regions increased their "burden" during the period by some 36 per cent while the "burden" on the labour force in the more developed regions will increase by only some 6 per cent. Thus, columns 4 and 6 show that the difference between the more developed and the less developed regions is decreasing rapidly during this period, and by 1985, the "burden" of total enrolment in the less developed regions approaches that of the more developed regions.

94. The relatively high "burden" on the labour force for the less developed regions, regardless of relatively low enrolment ratios, indicates that the two factors determining the number of pupils per 1,000 persons in the labour force, i.e., the age structure of the population and the labour force participation rates, are very different for the less developed regions as compared with the more developed regions. This can be seen from table 19, which gives the ratio between the population aged 6-11 years and the population aged 15-64 years, and the ratio between the total labour force and the population aged 15-64 years. The former ratio represents the age structure, while the latter is influenced both by the age structure of the working population and by the labour force participation rate for the various ages.

95. The table shows that the difference in age structure, the most important factor, as the total labour force expressed as a percentage of the population aged 15-64, was about the same for the less developed and the more developed regions in 1965. The relative size of the group aged 6-11 in the less developed regions was about double that of the more developed regions. This is the effect of the "young" population in the developing regions caused by high fertility and declining mortality.

TABLE 19. AGE STRUCTURE AND LABOUR FORCE PARTICIPATION RATES, BOTH SEXES

	Population 6-11 years / Population 15-64 years			*Total labour force / Population 15-64 years*		
	1965	*1975*	*1985*	*1965*	*1975*	*1985*
More developed regions ...	0.18	0.16	0.16	0.71	0.71	0.70
Less developed regions	0.30	0.30	0.30	0.71	0.67	0.65
South Asia.............	0.30	0.30	0.30	0.73	0.69	0.66
Africa	0.29	0.30	0.32	0.73	0.71	0.68
Latin Africa	0.30	0.29	0.29	0.59	0.57	0.55

96. The foregoing discussion illustrates the potential impact of differences in age structure and labour force participation rates on the "burden" of education on the labour force. Whether or not these differences lead to real differences in educational costs cannot be answered without examining the extent to which the pupils in the various regions are provided with teachers, class-rooms, equipment etc. This has been illustrated in table 20 in

TABLE 20. PUPIL/TEACHER RATIOS AND NUMBER OF TEACHERS PER 1,000 PERSONS IN THE LABOUR FORCE

	Pupil/teacher ratio		*Number of teachers per 1,000 persons in the labour force*		
	1965	*1975 and 1985*	*1965*	*1975*	*1985*
More developed regions ...	27	25	11.7	11.4	12.0
Less developed regions	35	35	7.9	9.3	9.5
	—	25	—	—	13.3

regard to primary-school teachers *This measure, in* addition to excluding all capital costs as well as other types of recurrent costs than those associated with the number of teachers, also neglects the differences in regional costs due to different levels of prices and salaries

97. Table 20 shows that in 1965 there were 11.7 primary-school teachers per 1,000 persons in the labour force in the more developed regions and that this figure, after a small decline between 1965 and 1975, will increase slightly to 12 teachers per 1,000 workers in 1985. For the less developed regions, the figure was 7.9 in 1965 and will increase to 9.5 in 1985 if these regions are to maintain their 1970 pupil/teacher ratio In case the less developed regions want to reduce their pupil/teacher ratio to 25 by 1985, 1.33 per cent of the total labour force has to be employed as primary-school teachers.

98. Lastly, it should be noted that a more relevant indicator would be, instead of comparing the number of teachers with the total labour force, to compare it *with the part of the labour force having an education* above a certain level. This would have given a more realistic indication of the "burden" as people having completed a level of education advanced enough to be considered as potential teachers are relatively much scarcer in the less developed regions than in the more developed regions Unfortunately, comparable data on the educational attainment of the population are not available.

CONCLUSIONS

99. Perhaps never since the Malthusian doctrine was promulgated has the world been so concerned over the growth of population and its effects upon the quality of human life on this planet. The adverse consequences of unrestrained increase in population appear likely to reach their most severe form at a time when the nations of the world are at last seeking to reconcile their differences and to reduce disparities through concerted international effort. Amongst these efforts, education has acquired a prominence, not only because of its role in promoting economic and social development, but because it serves to raise the dignity of man and enables him to extend the benefits of competence among the few to greater numbers and thereby to enrich the quality of life for all. It is, therefore, of great importance to inquire into the consequences for education of the continuation of trends of past into the future. The present report has attempted to do this by using the simplest index of educational participation generally available throughout the world, the enrolment ratio.

100. The most striking implication of these projections is perhaps that the disparities in enrolment ratios between the more developed regions and the less developed regions appear likely to continue, despite the efforts of the less developed regions to approach comparability with the more developed regions The pressure of population growth upon the less developed regions suggests that the problems of educational provision will be grave at all levels, whereas such pressure will be most easily met by the more developed regions There is little evidence that South Asia and Africa will succeed in doing more than maintain the current relative level of provision in response to the increasing numbers seeking admission to education. The prospects are somewhat brighter for Latin America. Whil· the more developed regions will have almost all children aged 6-17 in school by 1975, by 1985 the less developed regions as a whole will only be slightly nearer universal education for children aged 6-11 than they were in 1970 To reach universal education for this age range by 1985 would require that the less developed regions treble their average annual enrolment increase attained during the 1960s It goes without saying that attaining universal education for the age range 6-11 in 1985 will also have repercussions on the enrolment in the age range 12-17 Considering the difficulties encountered by a large number of developing countries in maintaining their past performance, the attainment of such a target would appear to necessitate a considerable increase in the resources made available to education As education already is consuming a large proportion of the national income, and as there are many competing demands on public funds, one might question whether universal primary education is a realistic target for 1985 for a large number of developing countries

101. Hence, demographic factors seem likely to continue to dominate the ability of States to provide places for potential students, unless national and international policies towards education change However urgent are the solutions to the world's problems of future population growth, world education must face up to the consequences of that growth even sooner, since many of the future enrolments projected here are already born A combination of even greater efforts and more imaginative interventions in the conservative practices of educational systems would appear to be required.

102. Not unnaturally, this stagnation of enrolment ratios in the less developed regions is reflected in the large projected increase in the number of youth not enrolled in the first two ranges. Within the age range 6-17 in the less developed regions, although the percentage out-of-school will decline from 58 per cent in 1965 to 50 per cent in 1985, the absolute number of out-of-school youth will increase by some 53 per cent. The problems for the out-of-school youth in the second range are particularly serious in those developing countries where there is a lack of employment possibilities.

103. Wastage through early drop-out is likely to contribute even more in the future to lack of ive contact with education than it ' the p e holding power of the educa ' ms developed regions is not ras

increase projected in the enrolment ratios for 1985 is too modest to make sufficient headway against population growth to win the battle against illiteracy.

104. Despite the handicap of sparse data, an attempt has been made in the report to estimate two important corollaries of the projected enrolments, the required increase in the number of primary teachers and the "burden" on the labour force. It appears that if the annual growth rate in the number of primary-school teachers attained between 1965 and 1970 can be maintained, then the less developed regions will be able to meet the projected enrolments, provided that there is no decrease in the pupil/teacher ratio. To attain universal primary education will, however, require a growth rate considerably higher than the one attained during the 1960s. Still more teachers are needed if the large number of unqualified teachers should be replaced by qualified teachers or the expatriate teachers by national teachers. This latter problem is particularly serious in secondary and higher education in certain areas, notably Africa. The economic implications of projected enrolments can only be represented by the ratio of projected enrolments per 1,000 persons of the projected labour force, but they are, nevertheless, sufficiently striking. The number of enrolments in all age ranges per 1,000 of the labour force will, in the less developed regions, be 456 in 1985 compared with 336 in 1965. The equivalent figures for the more developed regions are 504 and 475. Thus, because of the much larger proportion that children in school-going ages bear to the total population in the less developed regions as compared with the more developed regions, the burden of enrolment numbers on the labour force in the less developed regions will approach that of the more developed regions. Despite this, the less developed regions will in 1985 have only 32 per cent of their youth aged 6-29 in school while the enrolment ratio for this age range for the more developed regions will be 59 per cent.

105. The present report inevitably presents a view of future educational enrolment based upon the dynamics of demography. Actual events of the future will be based upon policy as much as or more than upon population change. Teacher recruitment and training, school buildings and equipment, provision for rural areas, improvement in the quality of education, and implementation of life-long education etc., are variables which will impose their own constraints and facilitations upon what actually happens. The projections discussed here are some of many necessary contributions to the formulation of appropriate educational policies. In some sense, these projections can be regarded as invitations to counteract perceptible education trends by developing alternative educational strategies.

ANNEX I

Methodology and data

The projection method

1. Concerning the basic choice between different approaches, trend extrapolation seemed appropriate since the purpose of this paper has been to derive the implications in terms of enrolment, enrolment ratios, out-of-school population, resources etc., should the educational trends observed during the past decade continue until 1985. The next two choices to be made were, first, to decide which trend to prolong, i.e., the trend in what variable; and, secondly, what mathematical function to apply to the past observations of the variable chosen. As concerns the last problem, the linear function was chosen as it fitted the observations for the last decade so well that the choice of a more complicated non-linear function did not seem justified. As concerns the trend to prolong, a different choice was made for the age range 6-11 depending upon whether a region belonged to the less developed or to the more developed regions. The procedure is described below.

The projection of the age-range 6-11

2. Concerning the choice of the trend to prolong, two variables seem to impose themselves: the number of pupils enrolled and the enrolment ratios. The former was chosen for the less developed regions and the latter for the more developed regions. The reason for this choice was, briefly, that there were found to be marked differences between more and less developed regions in the trend of the enrolment in this age range. For the more developed regions with almost universal primary education, enrolments clearly followed population growth. It was assumed likely that their enrolment in this age range in the future will also be determined by the growth of the population. An upper limit of 100 per cent was imposed for countries that have a legal age of admission to primary education of 6 years or less. For countries where the age of admission is 7 years, the upper limit was calculated such that it implied an enrolment ratio of 100 per cent for the age range 7-11. (This is the reason why the enrolment ratio for the age range 6-11 for the USSR is relatively low. The legal age of admission is 7 years, and the projected enrolment ratio of 82 per cent for 1985 implies 100 per cent enrolment for the age range 7-11.)

3. For the less developed regions, on the other hand, the growth in enrolment in the first range appeared in general to be relatively unrelated to population growth but to follow its own linear trend. This has been shown in paragraphs 15-31 of the paper. Principally because of this indication of linear development in the enrolment in the first age range during the past decade, it is the trend in the number of pupils enrolled that has been prolonged for this age range for the less developed regions. (However, the results of an alternative method are presented later in this annex.) The procedure followed was to project the enrolment in the age range 6-11 for each individual country either as a function of time or as equal to the population in this age range, depending upon whether the country in question had already reached an enrolment ratio of 100 per cent in 1970. For countries that, according to projections, will attain 100 per cent enrolment during the projection period, a shift was made from the former to the latter procedure as from the year this level will be attained. As stated above, the linear development of enrolment was chosen for countries that had not already reached an enrolment ratio of 100 per cent in 1970, since for most countries it fitted the observed development between 1960 and 1970 quite well.

The projection of the age-ranges 12-17 and 18-29

4. The enrolment in the two remaining age ranges was, as a rule, projected in the same way for all regions. (The excep-

tions were the USSR and Eastern Europe, for the reasons explained below) A ratio was formed of enrolments in the age range 12-17 to the enrolments in the age range 6-11, six years earlier. Although not a true survival proportion, since some of those in the 12-17 range would be new entrants, the ratio represented the transition of enrolled children between ranges sufficiently well to be of use in deriving trends. The same procedure was followed in deriving trends in transition from the second to the third range. The two ratios will be referred to as transition coefficients and are, apart from the cases when new entry takes place in the second range, indicators of educational survival in the system. The trend in the transition coefficients was, in general, extrapolated linearly. An upper limit of 97 per cent was imposed on the enrolment ratio for the age range 12-17 for the more developed regions Several regions reached this limit

5 This method of projecting the enrolment in the third range could not be used for the USSR and Eastern Europe, as the transition coefficients relating the age ranges 12-17 and 18-29 were declining steadily over time for these two regions An extrapolation of this trend would have led to an obvious underestimation of the enrolment ratio for the age range 18-29 in 1985 An examination of the data for the past years showed that this was caused by a rapid decline in the enrolment of pupils aged 18 years or more in secondary education, while the enrolment in higher education which pertains to the age range 18-29 increased steadily during the past decade. Thus, it appears that as soon as the enrolment of pupils aged 18 years or more in secondary education reaches its lowest level, the transition coefficient will stop declining The last observation available suggests that this may already be the case for Eastern Europe from 1970 onward. For these reasons, it was decided not to use the transition rate for these two regions and, for lack of anything better, the trends during the last decade of the enrolment ratios for the age range 18-29 were extrapolated linearly until 1985. The results derived from this method appeared reasonable compared with the other developed regions.

Transition coefficients and enrolment in the age-ranges 12-17 and 18-29

6 While the enrolment in the first age range was projected [illegible]

regional basis There were two major reasons for following this procedure

7 First, as explained in paragraphs 2 and 3, the enrolment in the age range 6-11 had to be projected separately for each country, as the future development will depend upon whether a country already had an enrolment ratio of 100 per cent in 1970, would reach 100 per cent between 1970 and 1985, or would not reach this level by 1985

8. Secondly, the somewhat irregular past development in the transition coefficients observed for particular countries tended to cancel out when calculated on a regional basis. Thus, although, in principle, it might have been preferable to treat the two last age ranges country by country, the regional grouping greatly facilitated the projection work.

Mathematical specification of the model

A mathematical specification of the model is given below, together with an explanation of how the various parameters have been estimated.

9 For the age range 6-11, the following expressions were employed

(1a) $E^t_{6\text{-}11} = at + b$ (used for developing countries having less than 100 per cent enrolment in this age range)

(1b) $E^t_{6\text{-}11} = P^t_{6\text{-}11}$ (used for developing countries as from the year an enrolment ratio of 100 per cent is reached)

(1c) $\dfrac{E^t_{6\text{-}11}}{P^t_{6\text{-}11}} = ct + d$ (used for developed countries)

where $E^t_{6\text{-}11}$, $P^t_{6\text{-}11}$ are the enrolment and the population in the first range in year t, respectively;

a, b, c and d are constants.

10 For the age ranges 12-17 and 18-29, the following expressions were employed.

(2) $E^t_{12\text{-}17} = k^t_1 \; E^{t-6}_{6\text{-}11}$

(3) $E^t_{18\text{-}29} = k^t_2 \; E^{t-6}_{12\text{-}17}$

where $E^t_{12\text{-}17}$, $E^t_{18\text{-}29}$ are the enrolment in the second and third ranges, respectively, in year t; and

$E^{t-6}_{6\text{-}11}$, $E^{t-6}_{12\text{-}17}$ are the enrolment in the first and second ranges, respectively, six years earlier than year t;

k^t_1 and k^t_2 are coefficients derived from the linear trend of

$\dfrac{E^t_{12\text{-}17}}{E^{t-6}_{6\text{-}11}}$, $\dfrac{E^t_{18\text{-}29}}{E^{t-6}_{12\text{-}17}}$, respectively.

11. As explained above, in the projections for a given region, the model (2)—(3) was used on regional data, projecting directly regional transition coefficients and regional enrolment However, (1a), (1b) and (1c) were used for each individual country, so that regional enrolment was obtained as a sum of expressions of the types (1a) or (1b) for the less developed regions and of (1c) for the more developed regions

12. In the cases where 100 per cent enrolment was not reached in the 6-11 age range and where the upper limit for enrolment in the 12-17 age range was not attained, the complete model used for the less developed regions was (1a), (2) and (3) In the model enrolment in the age range 6-11 [illegible]

implies non-linear extrapolation of second- and third-range enrolment. For example, if first-range enrolment and the survival rate between the first and second ranges are both increasing linearly with time, it implies that second-range enrolment will accelerate, i e , enrolment plotted as a function of time will be bending upward

13 For the more developed regions expressions [illegible]

three age ranges.

14 The parameters of expressions (1a) and (1c), as well as the two transition coefficients k^t_1 and k^t_2 were estimated by the least-square method, using past data on enrolment and transition coefficients. Expressions (1a) and (1c) were estimated for each individual country to which it was applied, based upon data for the period 1960-1970, 11 observa all. The coefficients k^t_1 and k^t_2 were estimated on a basis and due to the six-year time-lag, a minimum observations was available.

An alternative method for the 6-11 age range in less developed regions

15. An examination is now made of how different the projection results would have been for the less developed regions for the age group 6-11, if instead of projecting the number of pupils enrolled, the enrolment ratio for this age range had been projected. Considering that the population grows at an exponential rate and that the enrolment ratios for all less developed regions either increased or remained stable during the past decade, it is likely that a projection based upon the enrolment ratio would have led to higher estimates for the future enrolment than the procedure chosen. This statement is only true at the regional level. When countries are regarded individually, several developing countries had declining enrolment ratios during the period 1965-1970.

16. As shown in paragraphs 15-31 of the paper, the examination of the enrolment trends for the first age range during the past decade revealed an almost linear trend for the less developed regions.

17. The increase was somewhat slower for the period 1964-1970 than the period 1960-1964. Still, until 1970, this increase was more than sufficient to keep pace with population growth, which was, nevertheless, following a non-linear trend. The problem is illustrated by figure II, which gives for the less developed regions the observed growth in enrolment and population for the age range 6-11 during the period 1960-1970 and the projections for these two variables for 1975, 1980 and 1985.

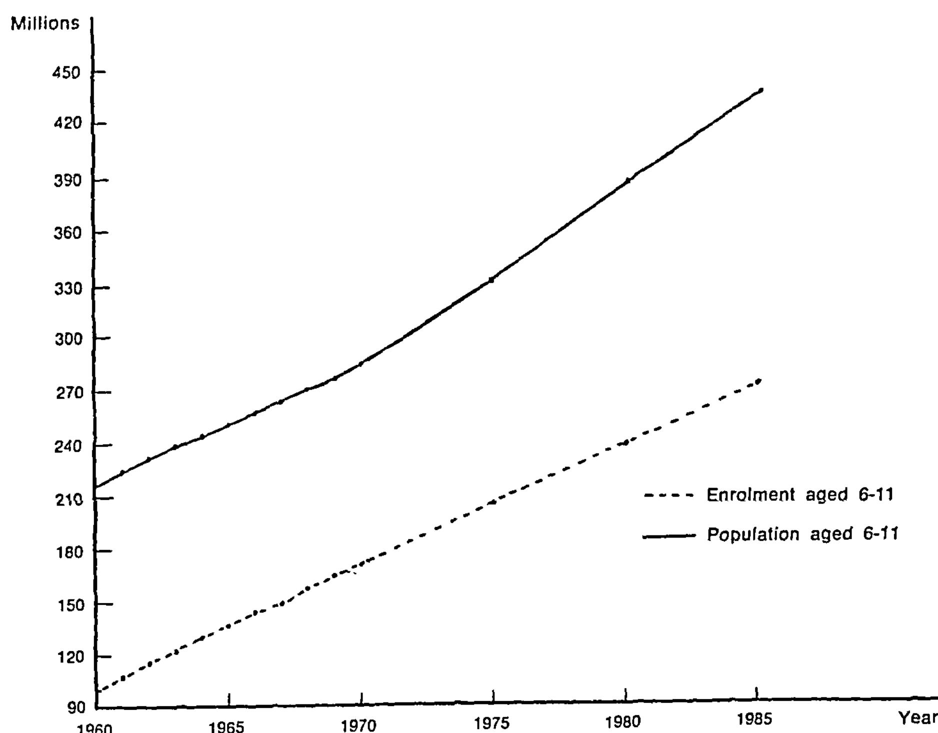
18. As an alternative to the linear projection of enrolment in the first range for the less developed regions, the enrolment ratio for this range was also projected in order to check the difference in results. The function chosen is the S-shaped or logistic function which assumes that the ratio will grow all the time, first at an increasing rate and, after the inflection point is reached, at a decreasing rate. This function seems reasonable because of the nature of the variable projected and because of the nature of the growth in the enrolment ratios during the past decade. The results of fitting a logistic curve to the observed enrolment ratios for the past decade for all the less developed regions taken together, as well as for each of the four main developing regions, are given in table 21. This table shows that for the less developed regions taken as a whole, this gives an enrolment ratio in 1985 which is three points higher than that obtained by extrapolating enrolment directly. Thus, the difference does not appear to be large enough to change the various conclusions drawn earlier in this paper. If the various continents are taken separately, the results for Asia and Africa are even closer to what was obtained through extrapolating the enrolment than for all the less developed regions together. For Latin America, however, a significant difference appears. If the development of the enrolment ratio were to follow a logistic curve, Latin America would reach an enrolment ratio of 99 per cent for the age group 6-11 by 1985.

Table 21. Enrolment ratios for 1975 and 1985, for the age group 6-11, based on the logistic curve

	1975		*1985*	
	Extrapolating enrolment	*Logistic curve*	*Extrapolating enrolment*	*Logistic curve*
Less developed regions ..	62	62	62	65
East Asia...........	99	99	99	99
South Asia..........	62	64	64	65
Africa	46	45	44	46
Latin America.......	74	80	74	99

19. This use of the logistic curve is based on fitting the curve to the observations of the enrolment ratios during the past decade without imposing any upper limit on their development. This upper limit may, however, be estimated once the function has been estimated. Thus, if the enrolment ratios were to develop according to this curve in the way determined by the observations for the period 1960-1970, their

Figure II. Growth in population and enrolment for the age range 6-11



implied upper limit would be 66 per cent for the less developed regions as a whole, as well as for South Asia, and 47 per cent for Africa. Latin America, on the other hand, would reach the theoretical upper limit of 100 per cent shortly after 1985, the upper limit implied by the fitting of the curve being more than 100 per cent.

20 Another way of estimating the logistic function would be to impose in advance an upper limit on the future development of the enrolment ratio If the theoretical upper limit of 100 per cent is chosen, the projected enrolment ratios for all the less developed regions taken together for 1985 would be 79 per cent For South Asia, Africa and Latin America, the corresponding ratios would be 81, 61 and 86 per cent, respectively Thus, apart from Latin America, this procedure would give a considerably higher estimate than the other estimation method. However, although the theoretical upper limit for the enrolment ratio for this age range is 100 per cent, it does not seem logical to impose such a limit for South Asia and Africa, so long as the purpose is to quantify the implications of past trends, should they continue until 1985

21. In conclusion, to extrapolate past trends in enrolment ratios by using the logistic function without imposing an upper limit of 100 per cent does not, for South Asia and Africa, give results significantly different from the ones obtained by extrapolating the number of pupils enrolled directly. For Latin America, on the other hand, this procedure would lead to considerably higher enrolment for 1985 than the figures presented in this paper It goes without saying that higher enrolment in the first range also has repercussions on enrolment in the second and third ranges.

DATA

22. The projections presented in this report are based on data on education enrolment collected through UNESCO questionnaires and field missions, as well as from national publications.

23 The demographic nature of the projections needed for the World Population Conference prescribed analysis and projections of enrolment by age, although data on enrolment by age were less commonly available than data on enrolment by level of education. A data base grouping the total number of pupils enrolled into the three age ranges, 6-11, 12-17 and 18-29, as well as by level of education was established separately for each country and by sex for each year for the period 1960-1970 The first step in establishing this base was to prepare the distribution by age and level for all countries and years for which such data were available Although the analyses presented in this report are by age ranges only, this classification by age range and level for the years for which this was possible facilitated greatly the estimation of enrolment by age ranges for years for which only data on enrolment by level were available

24 The second step was to make estimations for all years and countries for which age data were lacking For countries for which such data were not available for certain years or for parts of the educational system, the estimations were, in general, based on the data on enrolment by level (which were available for almost all countries for all years during the period 1960-1970), combined with the data on enrolment by age and level for years for which such data were available. For example, in cases where the age distribution of enrolment in primary education was missing for a given year, the enrolment in the age range 6-11 was estimated in the following way: first, the percentage that the enrolment in the age range 6-11 in primary education constituted of total enrolment in primary education was estimated for years for which age data were available; secondly, this percentage, after having taken into account changes over time, was multiplied by the enrolment in primary education for the year in question in order to derive an estimate of the enrolment in the age range 6-11 for that year

25. The procedure was similar for the two other age ranges. Estimates for years for which age data were not available were derived from the data on enrolment by level for those years, and data on enrolment by age and level for years for which age data could be obtained

26 In general, age data were available for some years for most countries There were, however, a number of countries, particularly in Africa, for which no such data were available The estimations of the age distribution for these countries were based on data on enrolment by level for the countries concerned supplemented by the distribution on age ranges for the enrolment by level for countries within the same region that had an educational system the structure of which was similar to the countries for which data were missing Comparisons made between the estimated age distribution and the distribution based on data on enrolment by age for several countries for which such data were obtained after the estimations were made, suggest that at least for these countries the method gave reasonable results.

27. It follows from the foregoing discussion that the projections and estimates of enrolment ratios presented in this report in general are based on data on enrolment by age and are not, as is often done when there is a lack of such data, obtained by dividing the enrolment at a given level (e g., primary education) by the size of the age group which, according to regulations, should be enrolled at this level Due to late entries and repetition in developing countries, this latter procedure may lead to gross over-estimation of the enrolment ratios

28 Lastly, two aspects concerning the grouping of ages into ranges should be noted First, there was some conflict between the first age range 6-11 adopted for this study and the enrolment practices of some countries where the legal age of admission to primary education is 5 or 7 years, respectively. This is particularly apparent for the USSR, where the entrance age to primary education is 7 years Because of this fact, the projected enrolment ratio for the USSR for the age range 6-11 is only 82 per cent for 1985. This implies, however, 100 per cent enrolment for the age range 7-11, as all children not enrolled in school in this age range are 6 years old Secondly, the age range 18-29 includes all pupils enrolled at school older than 17 years. The upper limit of 29 years has, however, been used when referring to these enrolments since the enrolment ratio for this age range was calculated on the bases of the population aged 18-29.

Approximate education survival rates

TABLE 22. APPROXIMATE EDUCATION SURVIVAL RATES FOR THE 1960 AND 1967 COHORTS, BOTH SEXES

Region	*Percentage of enrolment in grade 1 in 1960 that reached grade 4*	*Percentage of enrolment in grade 1 in 1967 that reached:* Grade 2	Grade 3	Grade 4
Less developed regions	*47*	*71*	*63*	*54*
East Asia	*95*	*98*	*97*	*97*
Japan	99	100	99	99
Other East Asia	91	97	95	94
South Asia	*48*	*72*	*63*	*53*
Middle South Asia	44	67	57	48
South-East Asia	54	83	77	61
South-West Asia	67	83	86	80
Africa[a]	*66*	*81*	*74*	*67*
Western Africa	60	81	71	64
Eastern Africa	63	82	74	68
Middle Africa	47	70	59	48
Northern Africa	85	90	88	83
Latin America	*34*	*59*	*50*	*42*
Tropical South America . . .	29	51	42	34
Middle America	35	67	57	47
Temperate South America . .	56	80	72	65
Caribbean	36	68	59	55

[a] *Excluding Southern Africa.*

TABLE 23. NUMBER OF AFRICAN CHILDREN FROM THE 1960 AND 1967 COHORTS, RESPECTIVELY, NOT REACHING GRADE 4

	1960					*1967*				
		Number of pupils not reaching grade 4					*Number of pupils not reaching grade 4*			
	Population aged 6 years 1	*Total* 2	*Never at school* 3	*Drop-outs* 4	*Percentage illiterate* 5	*Population aged 6 years* 6	*Total* 7	*Never at school* 8	*Drop-outs* 9	*Percentage illiterate* 10
Western Africa	2,327	1,678	1,241	437	72	2,779	1,990	1,552	438	72
Eastern Africa	2,222	1,632	1,290	342	73	2,638	1,774	1,322	452	67
Middle Africa	812	563	276	287	69	929	525	80	445	57
Northern Africa	1,898	818	620	198	43	2,357	1,173	929	244	50
Total Africa[a]	7,259	4,691	3,427	1,264	65	8,703	5,462	3,883	1,579	63

NOTE: Columns 1 and 6 give the population aged 6 years in 1960 and 1967, respectively, while columns 2 and 7 give the number of children from those two cohorts who did not reach grade 4, some because they had never been to school (columns 3 and 8) and some because they dropped out before reaching grade 4. Columns 5 and 10 give the percentage of the children from the two cohorts who did not reach grade 4. The figures in columns 3 and 8 were obtained by subtracting the new entrants in grade 1 (i.e., the enrolment in grade 1 minus repeaters) from the population aged 6 years in 1960 and 1967, respectively.

[a] Excluding Southern Africa.

ANNEX III

Enrolment projections and estimates

TABLE 24. ENROLMENT RATIOS FOR BOTH SEXES, BY AGE GROUP, REGION AND YEAR

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	*60.9*	*66.1*	*69.9*	*70.0*	*69.5*	*69.8*	*40.9*	*46.3*	*49.5*	*51.8*	*50.9*	*49.7*	*4.4*	*6.3*	*7.6*	*8.5*	*9.5*	*9.8*
More developed regions	90.5	91.3	93.0	94.2	94.5	94.5	77.8	82.2	86.4	90.8	93.1	95.2	8.2	12.1	14.0	15.9	18.8	20.8
Less developed regions	45.5	54.3	60.2	61.6	61.6	62.3	21.1	26.7	31.7	34.7	35.5	35.1	1.9	2.9	3.9	4.5	4.9	5.1
Asia[a]	*51.4*	*59.2*	*64.6*	*65.5*	*65.4*	*67.0*	*25.4*	*30.4*	*33.1*	*36.0*	*36.5*	*35.9*	*2.1*	*3.1*	*3.9*	*4.2*	*4.3*	*4.4*
East Asia	*95.8*	*95.9*	*98.3*	*99.4*	*99.4*	*99.4*	*64.0*	*69.0*	*69.1*	*74.6*	*80.1*	*83.0*	*3.7*	*5.4*	*7.1*	*7.3*	*8.6*	*9.9*
Japan	100.8	100.6	99.9	100.0	100.0	100.0	78.6	84.0	89.0	94.9	97.0	97.0	3.7	5.6	7.5	7.3	8.8	11.3
Other East Asia	87.3	91.1	96.8	98.8	98.8	98.8	34.0	40.8	47.2	56.0	63.6	68.7	3.6	4.9	6.5	7.2	8.3	8.6
South Asia	*45.0*	*54.7*	*60.9*	*62.2*	*62.3*	*64.1*	*19.2*	*24.5*	*28.6*	*31.5*	*32.1*	*31.5*	*1.9*	*2.8*	*3.4*	*3.8*	*3.8*	*3.8*
Middle South Asia	41.3	51.9	58.5	59.9	60.3	63.2	16.7	22.2	26.0	29.1	29.5	28.9	1.6	2.4	2.9	3.3	3.4	3.3
South-East Asia	56.0	62.3	67.3	68.4	67.6	67.3	23.6	29.0	33.0	34.9	35.8	35.2	2.3	3.4	4.0	4.3	4.1	4.1
South-West Asia	42.5	53.8	59.2	61.2	61.7	60.9	26.9	30.7	37.8	42.0	42.7	42.8	3.1	4.5	5.4	6.0	6.7	6.9
Europe	*88.0*	*90.1*	*92.9*	*95.0*	*96.3*	*96.5*	*64.5*	*69.1*	*76.3*	*84.4*	*89.7*	*94.5*	*6.5*	*9.6*	*11.8*	*14.2*	*17.6*	*20.6*
Western Europe	93.4	93.9	96.7	98.6	99.9	100.0	79.7	79.4	86.2	96.3	97.2	97.0	6.7	8.8	11.4	13.4	17.2	19.4
Southern Europe	84.1	88.3	93.4	97.3	100.0	100.0	40.8	50.6	59.3	69.3	79.7	89.9	5.3	8.7	11.9	14.0	17.3	20.7
Eastern Europe	82.0	84.0	83.7	83.9	84.2	84.4	74.4	78.4	83.6	87.3	91.0	95.0	7.9	13.0	13.4	16.0	18.0	19.9
Northern Europe	94.6	95.9	96.5	97.7	98.6	99.4	66.3	68.2	76.9	84.1	91.5	97.2	6.5	8.4	10.3	13.2	18.3	23.3
USSR	*82.5*	*82.8*	*84.6*	*83.6*	*82.3*	*82.2*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*6.5*	*12.3*	*13.4*	*15.4*	*17.4*	*19.5*
Africa	*33.0*	*40.3*	*44.2*	*45.8*	*45.6*	*44.3*	*17.1*	*22.2*	*27.6*	*28.9*	*29.9*	*29.8*	*0.9*	*1.4*	*2.3*	*2.9*	*3.6*	*4.1*
Western Africa	24.3	28.3	29.7	30.5	30.0	28.6	13.6	16.0	18.7	19.0	19.7	19.2	0.6	0.9	1.3	1.6	1.8	2.1
Eastern Africa	25.4	30.5	36.2	37.5	37.9	37.3	14.7	18.8	22.7	25.3	26.2	25.9	0.3	0.6	1.2	1.9	2.6	3.2
Middle Africa	42.5	55.4	67.5	73.5	75.1	75.2	14.7	23.4	37.2	41.9	48.4	51.9	0.4	0.9	1.6	2.5	3.5	4.4
Northern Africa	42.6	51.8	51.8	52.1	50.6	48.3	16.2	23.0	28.9	28.6	29.4	29.2	1.6	2.7	4.4	5.3	6.2	7.0
Southern Africa	55.1	70.9	81.3	85.0	86.5	86.5	50.5	60.1	70.8	73.3	68.8	65.0	3.4	3.7	4.6	5.1	5.4	5.3
Northern America	*98.8*	*99.2*	*99.2*	*100.0*	*100.0*	*100.0*	*93.4*	*94.5*	*95.5*	*97.0*	*97.0*	*97.0*	*18.4*	*21.7*	*23.3*	*24.5*	*27.2*	*27.4*
tin America	*58.9*	*64.9*	*72.4*	*74.8*	*75.3*	*74.7*	*34.7*	*41.8*	*48.7*	*52.7*	*54.8*	*54.5*	*3.8*	*5.4*	*7.8*	*9.5*	*10.8*	*11.2*
Tropical South America	52.8	59.3	66.1	69.0	69.7	69.3	29.6	38.0	46.9	50.7	53.2	53.2	3.8	5.7	9.2	11.2	12.5	12.1
Middle America (mainland)	56.6	65.2	76.2	77.7	78.4	77.5	34.9	41.1	46.1	49.1	49.4	47.7	2.6	3.8	5.3	7.1	8.6	9.8
Temperate South America	84.2	87.4	92.1	96.1	95.7	95.1	49.7	55.5	61.7	71.2	77.7	81.4	5.8	8.1	8.6	9.4	10.8	11.8
Caribbean	65.8	68.0	75.8	77.1	79.4	80.0	42.0	47.1	48.4	51.5	52.6	53.2	3.4	4.1	4.8	5.5	6.0	6.5
ania	*88.7*	*89.4*	*92.5*	*90.9*	*90.8*	*91.0*	*61.2*	*66.1*	*71.2*	*77.2*	*80.6*	*81.7*	*8.4*	*10.4*	*12.3*	*14.1*	*16.4*	*18.0*
Australia and New Zealand	98.3	99.1	102.1	100.0	100.0	100.0	69.6	74.0	79.9	87.9	92.9	94.9	10.6	12.8	14.7	16.7	19.8	22.0
Melanesia	45.7	47.7	51.4	53.1	53.7	54.0	26.8	29.6	31.4	31.8	33.2	33.0	0.2	0.8	1.7	2.0	2.4	3.0
Polynesia and Micronesia	84.6	85.7	94.3	97.9	97.8	98.0	47.9	60.1	68.5	70.5	76.3	78.2	4.2	5.0	6.9	8.9	9.3	9.6

[a] Excluding mainland region

TABLE 25. ENROLMENT RATIOS FOR BOYS, BY AGE GROUP, REGION AND YEAR

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	*66.7*	*72.1*	*75.8*	*75.8*	*75.1*	*75.4*	*45.7*	*51.3*	*55.1*	*57.1*	*56.2*	*54.7*	*5.9*	*8.0*	*9.3*	*10.2*	*11.2*	*11.4*
More developed regions	90.4	91.2	92.9	94.1	94.5	94.5	79.5	83.3	87.3	91.2	93.5	95.4	10.5	14.5	16.4	18.1	21.1	23.2
Less developed regions	54.4	63.2	68.6	69.5	69.0	69.7	27.6	33.8	39.4	42.2	42.6	41.6	2.9	4.0	5.2	5.9	6.3	6.3
Asia[a]	*61.4*	*69.5*	*74.5*	*74.8*	*74.2*	*76.1*	*32.3*	*37.9*	*41.4*	*44.1*	*44.1*	*42.9*	*3.3*	*4.6*	*5.5*	*5.7*	*5.8*	*5.7*
East Asia	*97.7*	*97.4*	*99.7*	*99.4*	*99.4*	*99.4*	*68.1*	*72.0*	*72.6*	*78.7*	*83.5*	*86.0*	*6.1*	*8.0*	*10.0*	*9.9*	*11.6*	*13.2*
Japan	101.1	101.0	100.3	100.0	100.0	100.0	80.5	85.6	89.2	93.8	97.0	97.0	6.0	8.5	10.6	9.9	11.8	15.0
Other East Asia	92.0	93.8	99.2	98.8	98.8	98.8	43.2	47.1	54.3	64.6	70.2	74.6	6.2	7.1	8.9	9.8	11.4	11.5
South Asia	*56.2*	*66.1*	*71.7*	*72.4*	*71.9*	*74.0*	*26.6*	*32.6*	*37.5*	*40.2*	*40.1*	*38.9*	*2.9*	*4.0*	*4.8*	*5.1*	*5.0*	*4.8*
Middle South Asia	54.8	66.2	72.3	73.1	73.1	76.6	24.9	31.4	36.3	38.9	38.5	37.1	2.6	3.7	4.5	4.9	4.7	4.4
South-East Asia	61.1	66.3	70.8	70.9	69.2	68.6	28.5	33.9	37.8	40.0	40.8	39.8	2.9	4.1	4.7	4.8	4.5	4.6
South-West Asia	52.0	64.4	69.5	71.0	70.8	69.3	35.7	40.0	48.9	53.4	53.7	53.1	4.9	6.7	7.8	8.8	9.8	10.1
Europe	*87.8*	*89.9*	*92.6*	*94.8*	*96.3*	*96.6*	*67.6*	*71.5*	*78.3*	*85.5*	*90.6*	*95.0*	*8.6*	*11.8*	*13.9*	*16.3*	*19.9*	*23.0*
Western Europe	93.3	93.6	96.2	98.0	99.8	100.0	81.2	80.2	86.8	96.0	97.4	97.0	8.7	11.0	14.2	16.6	21.1	23.8
Southern Europe	84.1	88.3	93.3	97.3	100.0	100.0	47.1	55.8	63.9	73.1	82.5	91.6	7.7	11.7	15.1	16.8	20.0	23.2
Eastern Europe	81.4	83.9	83.6	84.2	84.7	85.2	77.0	80.5	85.0	88.3	91.3	95.0	9.8	14.3	13.3	16.0	18.0	20.0
Northern Europe	94.5	95.7	96.4	97.4	98.2	99.0	67.3	69.2	77.3	84.0	90.8	97.3	8.5	10.4	12.2	15.1	20.3	25.2
USSR	*82.8*	*82.7*	*84.6*	*83.6*	*82.3*	*82.2*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*7.6*	*13.3*	*13.9*	*15.9*	*17.9*	*19.9*
Africa	*40.9*	*48.3*	*51.8*	*52.9*	*52.1*	*50.1*	*23.0*	*29.3*	*35.8*	*36.8*	*37.6*	*36.9*	*1.4*	*2.2*	*3.4*	*4.2*	*5.0*	*5.7*
Western Africa	30.9	34.6	36.6	36.8	36.0	34.1	19.5	21.9	24.9	25.6	26.3	25.9	0.9	1.4	2.0	2.6	3.0	3.5
Eastern Africa	31.5	35.8	41.0	41.7	41.4	40.1	20.6	25.5	30.0	33.0	34.2	34.2	0.5	1.0	1.8	2.8	3.9	4.9
Middle Africa	57.0	72.5	82.4	87.7	87.6	86.4	22.7	34.7	51.9	55.3	61.4	63.5	0.7	1.4	2.7	4.0	5.2	6.3
Northern Africa	53.4	63.5	62.5	62.7	60.3	57.1	22.7	32.0	39.2	37.4	37.1	35.0	2.6	4.1	6.4	7.1	7.8	8.5
Southern Africa	54.0	69.6	80.5	83.9	85.5	85.5	51.3	60.9	72.1	76.4	71.9	68.6	4.7	5.2	6.3	6.8	7.1	6.7
Northern America	*98.7*	*99.0*	*99.0*	*100.0*	*100.0*	*100.0*	*93.4*	*94.6*	*96.0*	*97.0*	*97.0*	*97.0*	*22.7*	*26.4*	*27.6*	*28.5*	*31.1*	*31.1*
Latin America	*59.0*	*64.5*	*71.9*	*74.3*	*74.7*	*74.0*	*37.0*	*44.0*	*50.4*	*54.1*	*56.3*	*56.0*	*4.7*	*6.5*	*9.1*	*10.9*	*12.2*	*12.6*
Tropical South America	52.9	59.1	65.4	68.1	68.5	67.9	31.5	39.7	47.9	50.9	53.2	53.0	4.7	6.7	10.4	12.3	13.4	12.9
Middle America (mainland)	56.9	64.0	75.9	77.7	78.3	77.4	39.3	46.0	51.5	54.6	55.4	53.6	3.8	5.3	7.5	9.7	11.8	13.5
Temperate South America	84.1	86.7	91.0	95.5	95.4	95.1	51.0	55.5	61.2	70.1	77.5	81.1	6.9	8.8	9.1	9.9	11.5	12.5
Caribbean	65.2	68.7	76.1	77.7	80.3	80.9	42.6	47.6	48.3	51.4	52.8	53.5	3.9	4.5	5.4	6.3	7.0	7.9
Oceania	*90.5*	*91.3*	*94.0*	*92.8*	*92.9*	*93.0*	*64.8*	*68.5*	*74.4*	*80.7*	*84.9*	*85.1*	*12.5*	*15.3*	*17.8*	*20.0*	*23.1*	*25.1*
Australia and New Zealand	99.6	99.8	101.9	100.0	100.0	100.0	72.6	75.9	82.8	91.1	96.6	97.0	15.8	18.9	21.3	23.6	27.6	30.3
Melanesia	50.3	55.2	60.2	62.9	64.0	64.0	33.3	35.8	38.1	38.1	40.9	42.0	0.4	1.6	2.8	3.5	4.3	5.4
Polynesia and Micronesia	87.5	88.5	95.4	98.4	97.8	98.0	53.2	60.5	68.8	71.7	76.9	78.9	5.9	6.8	9.5	12.3	12.8	13.1

[a] Excluding mainland region.

TABLE 26 ENROLMENT RATIOS FOR GIRLS, BY AGE GROUP, REGION AND YEAR

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	*54.8*	*59.8*	*63.8*	*63.9*	*63.6*	*63.9*	*35.9*	*41.1*	*43.7*	*46.2*	*45.4*	*44.5*	*3.0*	*4.6*	*5.8*	*6.8*	*7.7*	*8.1*
More developed regions	90.5	91.4	93.2	94.3	94.5	94.4	76.1	81.0	85.5	90.4	92.7	95.0	6.0	9.5	11.6	13.6	16.4	18.4
Less developed regions	36.4	45.2	51.6	53.4	53.9	54.7	14.5	19.3	23.7	26.9	28.2	28.3	1.0	1.7	2.5	3.1	3.5	3.8
Asia[a]	*41.0*	*48.5*	*54.3*	*55.7*	*56.1*	*57.4*	*18.3*	*22.6*	*24.4*	*27.4*	*28.5*	*28.5*	*0.9*	*1.7*	*2.3*	*2.6*	*2.8*	*3.1*
East Asia	*93.7*	*94.4*	*96.9*	*99.4*	*99.4*	*99.4*	*59.7*	*65.9*	*65.5*	*70.5*	*76.6*	*80.0*	*1.4*	*2.8*	*4.2*	*4.6*	*5.5*	*6.6*
Japan	100.5	100.2	99.5	100.0	100.0	100.0	76.8	82.5	88.9	96.1	97.0	97.0	1.4	2.8	4.3	4.6	5.7	7.5
Other East Asia	82.2	88.4	94.4	98.8	98.8	98.8	24.2	34.1	39.7	47.1	56.7	62.6	1.2	2.7	3.9	4.5	5.2	5.7
South Asia	*33.4*	*42.9*	*49.4*	*51.4*	*52.1*	*53.7*	*11.6*	*15.9*	*19.3*	*22.4*	*23.5*	*23.6*	*0.9*	*1.5*	*2.0*	*2.3*	*2.5*	*2.7*
Middle South Asia	27.2	36.9	43.7	45.8	46.7	49.1	8.2	12.4	15.2	18.6	19.9	20.2	0.5	1.0	1.4	1.7	2.0	2.2
South-East Asia	50.7	58.3	63.8	65.8	66.0	65.9	18.8	24.0	28.2	29.8	30.7	30.5	1.6	2.6	3.4	3.7	3.7	3.5
South-West Asia	32.3	42.7	48.5	51.1	52.2	52.2	17.3	20.6	26.1	30.2	31.3	32.0	1.2	2.1	2.7	3.0	3.3	3.5
Europe	*88.2*	*90.2*	*93.1*	*95.2*	*96.2*	*96.4*	*61.3*	*66.6*	*74.3*	*83.1*	*88.9*	*94.0*	*4.4*	*7.4*	*9.7*	*12.0*	*15.2*	*18.1*
Western Europe	93.6	94.3	97.2	99.3	100.0	100.0	78.1	78.6	85.5	96.7	97.0	97.0	4.6	6.5	8.5	10.1	13.0	14.9
Southern Europe	84.2	88.3	93.5	97.3	100.0	100.0	34.4	45.1	54.5	65.4	76.8	88.2	3.0	5.7	8.7	11.0	14.5	18.2
Eastern Europe	82.5	84.1	83.8	83.6	83.6	83.6	71.7	76.1	82.0	86.3	90.6	95.0	5.9	11.6	13.4	16.0	18.0	19.8
Northern Europe	94.7	96.1	96.6	98.0	99.0	99.9	65.4	67.2	76.4	84.1	92.2	97.0	4.5	6.3	8.3	11.2	16.2	21.4
USSR	*82.2*	*82.9*	*84.7*	*83.6*	*82.3*	*82.2*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*97.0*	*5.4*	*11.3*	*12.8*	*14.9*	*16.9*	*19.0*
Africa	*25.1*	*32.2*	*36.5*	*38.5*	*39.0*	*38.4*	*11.1*	*15.1*	*19.5*	*20.9*	*22.2*	*22.6*	*0.4*	*0.6*	*1.1*	*1.7*	*2.1*	*2.6*
Western Africa	17.8	22.2	22.9	24.2	24.1	23.2	7.7	10.2	12.6	12.5	13.1	12.6	0.2	0.3	0.5	0.6	0.6	0.6
Eastern Africa	19.4	25.2	31.4	33.4	34.5	34.4	8.9	12.3	15.4	17.6	18.2	17.7	0.2	0.3	0.6	0.9	1.3	1.6
Middle Africa	28.3	38.8	53.0	59.4	62.8	64.0	7.0	12.4	22.8	28.9	35.6	40.5	0.2	0.3	0.5	1.1	1.8	2.5
Northern Africa	31.4	39.7	40.7	41.2	40.5	39.1	9.6	13.7	18.3	19.4	21.4	23.2	0.6	1.2	2.4	3.5	4.5	5.5
Southern Africa	56.3	72.1	82.1	86.0	87.5	87.6	49.7	59.3	69.6	70.2	65.6	61.4	2.1	2.1	2.8	3.5	3.8	3.9
Northern America	*98.9*	*99.4*	*99.4*	*100.0*	*100.0*	*100.0*	*93.3*	*94.4*	*95.1*	*97.0*	*97.0*	*97.0*	*14.1*	*16.9*	*19.0*	*20.4*	*23.1*	*23.6*
Latin America	*58.8*	*65.3*	*73.0*	*75.3*	*76.0*	*75.5*	*32.4*	*39.7*	*46.8*	*51.3*	*53.1*	*53.0*	*2.9*	*4.4*	*6.5*	*8.1*	*9.2*	*9.8*
Tropical South America	52.7	59.5	66.8	70.0	70.9	70.7	27.7	36.3	46.0	50.5	53.2	53.5	2.9	4.7	8.0	10.1	11.5	12.0
Middle America (mainland)	56.2	66.4	76.6	77.7	78.5	77.7	30.4	36.1	40.5	43.4	43.2	41.4	1.5	2.2	3.2	4.3	5.3	5.9
Temperate South America	84.3	88.1	93.2	96.7	96.0	95.1	48.5	55.5	62.2	72.3	77.9	81.8	4.7	7.3	7.9	8.8	10.2	11.0
Caribbean	66.3	67.2	75.5	76.4	78.5	79.1	41.4	46.7	48.6	51.7	52.4	52.9	2.9	3.7	4.2	4.6	4.9	5.1
Oceania	*86.8*	*87.3*	*90.9*	*88.8*	*88.6*	*88.9*	*57.4*	*63.6*	*67.9*	*73.5*	*76.1*	*78.2*	*4.0*	*5.2*	*6.4*	*7.8*	*9.4*	*10.6*
Australia and New Zealand	97.0	98.4	102.2	100.0	100.0	100.0	66.5	72.0	76.9	84.6	88.9	92.8	5.0	6.5	7.7	9.4	11.5	13.2
Melanesia	40.8	39.9	42.0	43.0	43.3	43.7	19.7	22.8	24.0	25.1	25.2	24.0	0.0	0.0	0.4	0.3	0.3	0.5
Polynesia and Micronesia	81.6	82.8	93.2	97.4	97.7	97.9	42.1	59.7	68.2	69.3	75.7	77.3	2.4	3.1	4.2	5.4	5.6	5.9

[a] Excluding mainland region.

TABLE 27. ENROLMENT RATIOS FOR THE AGE GROUP 6-29, BY REGION AND YEAR

Major areas and regions	Total						Boys						Girls					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	*31.4*	*36.0*	*38.4*	*38.8*	*38.9*	*39.0*	*35.2*	*40.0*	*42.5*	*42.8*	*42.8*	*42.8*	*27.5*	*31.8*	*34.1*	*34.7*	*34.8*	*35.0*
More developed regions	49.1	53.7	55.2	55.3	56.6	59.1	50.8	55.3	56.6	56.6	58.0	60.4	47.3	52.1	53.7	54.0	55.2	57.7
Less developed regions	21.2	26.3	30.0	31.4	31.8	31.8	26.2	31.7	35.4	36.6	36.7	36.4	16.0	20.8	24 3	26.0	26.7	26.9
Asia[a]	*24.0*	*28.7*	*31.3*	*32.5*	*32.8*	*32.9*	*29.7*	*34.8*	*37.5*	*38.3*	*38.3*	*38.2*	*18.2*	*22.5*	*24.9*	*26.4*	*27.0*	*27.3*
East Asia	*46.9*	*48.2*	*47.4*	*48.8*	*51.9*	*54.4*	*50.2*	*50.9*	*50.1*	*51.0*	*54.3*	*56.8*	*43.5*	*45.4*	*44.6*	*46.4*	*49.4*	*51.9*
Japan	50.5	50.0	46.6	49.0	55.2	59.1	52.6	52.4	48.8	50.3	56.8	61.0	48.4	47.7	44.4	47.5	53.5	57.3
Other East Asia	39.6	45.2	48.4	48.5	48.5	49.7	45.5	48.6	51.9	51.9	51.6	52.6	33.6	41.6	44.8	45.1	45.2	46.6
South Asia	*20.4*	*25.9*	*29.1*	*30.5*	*30.7*	*30.8*	*26.4*	*32.4*	*35.8*	*36.8*	*36.6*	*36.4*	*14.2*	*19.0*	*22.2*	*23.9*	*24.5*	*24.9*
Middle South Asia	18.5	24.2	27.4	28.9	29.2	29.7	25.5	32.2	35.5	36.5	36.4	36.5	11.2	16.0	18.9	20.7	21.6	22.3
South-East Asia	24.9	29.6	33.0	34.0	33.6	32.7	28.2	32.5	35.8	36.5	35.7	34.7	21.6	26.6	30.1	31.4	31.4	30.7
South-West Asia	22.4	28.0	31.9	33.6	34.4	34.3	28.7	34.8	38.9	40.7	41.4	41.0	15.6	20.7	24.4	26.2	27.0	27.2
Europe	*43.6*	*47.4*	*50.4*	*53.3*	*56.7*	*59.6*	*45.5*	*49.2*	*52.0*	*54.7*	*58.1*	*61.1*	*41.6*	*45.6*	*48.8*	*51.9*	*55.2*	*58.1*
Western Europe	48.1	49.5	53.8	58.0	60.0	60.3	49.3	50.4	55.0	59.3	62.0	62.5	46.7	48.6	52.6	56.7	57.9	58.0
Southern Europe	35.2	41.8	47.0	50.9	55.8	59.9	38.3	45.1	50.0	53.4	57.9	61.6	32.1	38.5	43.9	48.3	53.5	58.1
Eastern Europe	45.6	51.6	50.9	49.9	51.6	55.8	47.2	53.1	51.4	50.3	51.9	56.1	43.9	50.2	50.4	49.4	51.3	55.5
Northern Europe	47.5	47.0	49.4	53.5	59.2	62.8	48.8	48.2	50.5	54.4	60.0	63.8	46.1	45.6	48.3	52.4	58.3	61.9
USSR	*45.7*	*56.3*	*58.9*	*54.6*	*51.8*	*54.1*	*46.9*	*57.0*	*59.3*	*55.0*	*52.2*	*54.3*	*44.6*	*55.5*	*58.4*	*54.2*	*51.4*	*53.8*
Africa	*15.5*	*19.5*	*22.7*	*24.0*	*24.7*	*24.6*	*19.8*	*24.3*	*27.8*	*29.0*	*29.5*	*29.2*	*11.2*	*14.7*	*17.6*	*18.9*	*19.8*	*20.0*
Western Africa	11.6	13.7	15.2	15.8	16.0	15.6	15.3	17.3	19.3	20.0	20.3	19.9	7.9	10.1	11.1	11.6	11.8	11.4
Eastern Africa	12.2	15.1	18.3	19.9	20.7	20.8	15.9	18.8	22.2	23.7	24.6	24.7	8.7	11.5	14.6	16.0	16.8	16.9
Middle Africa	17.5	24.0	31.9	35.7	38.9	40.8	24.4	32.8	41.1	44.5	47.4	48.6	10.8	15.6	22.9	27.0	30.6	33.1
Northern Africa	18.9	24.3	26.8	27.3	27.5	27.0	24.6	31.2	33.9	34.0	33.5	32.2	13.0	17.1	19.4	20.4	21.2	21.6
Southern Africa	32.1	39.6	46.1	48.7	49.0	48.3	32.3	39.8	46.8	49.9	50.3	49.7	31.9	39.4	45.4	47.4	47.6	46.9
Northern America	*64.9*	*66.4*	*65.0*	*62.8*	*62.5*	*63.9*	*66.9*	*68.6*	*67.1*	*64.9*	*64.7*	*65.9*	*62.9*	*64.2*	*62.8*	*60.7*	*60.3*	*61.9*
Latin America	*30.2*	*35.0*	*40.1*	*42.3*	*43.3*	*43.1*	*31.3*	*36.0*	*41.1*	*43.1*	*44.2*	*43.9*	*29.1*	*33.9*	*39.1*	*41.4*	*42.3*	*42.3*
Tropical South America	27.0	32.2	38.2	40.7	41.9	41.7	27.9	33.1	38.8	41.0	42.0	41.5	26.1	31.3	37.5	40.4	41.8	42.0
Middle America (mainland)	29.7	35.3	41.0	42.5	43.1	42.5	31.8	37.1	43.4	45.2	46.0	45.6	27.7	33.4	38.5	39.8	40.1	39.3
Temperate South America	40.9	44.6	47.3	50.4	52.3	53.5	41.8	44.9	47.2	50.3	52.5	53.7	40.0	44.4	47.3	50.6	52.1	53.2
Caribbean	34.2	36.6	39.5	40.3	40.9	41.3	34.7	37.4	39.9	40.9	41.7	42.2	33.6	35.8	39.0	39.7	40.1	40.3
Oceania	*48.1*	*49.9*	*51.6*	*51.9*	*53.6*	*55.3*	*51.2*	*53.1*	*55.3*	*56.1*	*58.2*	*59.8*	*44.8*	*46.6*	*47.7*	*47.6*	*48.7*	*50.5*
Australia and New Zealand	54.2	55.6	56.8	57.1	59.4	62.0	57.4	58.8	60.4	61.2	64.1	66.3	50.9	52.2	52.9	52.8	54.5	57.4
Melanesia	21.4	23.5	25.9	26.7	27.3	27.4	24.4	27.6	31.0	32.1	33.2	33.8	18.0	19.0	20.4	21.1	21.1	20.7
Polynesia and Micronesia	44.3	48.6	53.4	54.1	54.6	54.9	47.6	50.2	54.9	56.1	56.2	56.5	40.9	46.9	51.8	52.1	53.0	53.2

[a] Excluding mainland region.

TABLE 28 NUMBER OF PUPILS ENROLLED, BY AGE GROUP, REGION AND YEAR; BOTH SEXES

(Thousands)

Major areas and regions	6-11 years 1960	1965	1970	1975	1980	1985	12-17 years 1960	1965	1970	1975	1980	1985	18-29 years 1960	1965	1970	1975	1980	1985
World total	*200175*	*242129*	*281588*	*312995*	*352635*	*397438*	*108227*	*146470*	*175507*	*201918*	*219853*	*243745*	*19998*	*30490*	*40903*	*53561*	*60961*	*76531*
More developed regions	101499	106252	110638	108306	114331	124441	71804	91841	99759	107978	107397	113369	14681	21861	27566	35143	43672	48727
Less developed regions	98676	135877	170950	204689	238304	272997	36423	54629	75748	93940	112456	130376	5317	8629	13337	18418	23289	27804
Asia[a]	*80569*	*104476*	*127561*	*151732*	*173548*	*200061*	*31682*	*45346*	*56241*	*68069*	*80603*	*92923*	*4345*	*6888*	*9851*	*12354*	*14587*	*16889*
East Asia	*18942*	*18401*	*19458*	*20652*	*22449*	*24348*	*11042*	*13758*	*13103*	*14609*	*16325*	*18332*	*1081*	*1677*	*2523*	*2726*	*3262*	*3834*
Japan	12485	9776	9494	10323	11408	12108	9111	10933	8858	8909	9776	10830	757	1184	1774	1676	1768	2165
Other East Asia	6457	8625	9964	10329	11041	12240	1931	2825	4245	5700	6549	7502	324	493	749	1050	1494	1719
South Asia	*61627*	*86075*	*108103*	*131080*	*153099*	*175713*	*20640*	*31588*	*43138*	*53460*	*64278*	*74591*	*3264*	*5211*	*7328*	*9628*	*11325*	*13005*
Middle South Asia	38594	55292	69381	85079	100175	116271	11985	19517	26674	32973	39779	46277	1887	2974	4274	5803	6804	7691
South-East Asia	18999	25130	31452	37116	42431	47342	6699	9294	12620	15579	18543	21325	1016	1670	2249	2744	3129	3644
South-West Asia	4034	5653	7270	8885	10493	12100	1956	2777	3844	4908	5956	6989	361	567	805	1081	1392	1670
Europe	*38306*	*40279*	*42499*	*44519*	*46684*	*48744*	*25258*	*30111*	*33838*	*38256*	*41690*	*45329*	*4865*	*7283*	*9447*	*12167*	*15539*	*18630*
Western Europe	12015	12563	14078	14749	15093	15575	9184	10396	11444	13811	14505	14576	1534	2139	2842	3471	4644	5565
Southern Europe	10443	11463	12637	13567	14366	14939	4716	6268	7570	9220	10961	12733	1203	1858	2663	3373	4339	5409
Eastern Europe	9190	9477	8347	8329	8923	9371	6467	8513	9488	8911	8900	9998	1378	2198	2485	3401	3913	4052
Northern Europe	6658	6776	7437	7874	8302	8859	4891	4934	5336	6314	7324	8022	750	1088	1457	1922	2643	3604
USSR	*21747*	*23754*	*24537*	*20843*	*21204*	*23994*	*15733*	*24711*	*27332*	*28387*	*24686*	*24447*	*2976*	*5019*	*5350*	*7731*	*9795*	*10712*
Africa	*14008*	*19304*	*24283*	*29116*	*34077*	*39033*	*6045*	*8860*	*12490*	*14986*	*17985*	*21051*	*506*	*873*	*1557*	*2292*	*3175*	*4272*
Western Africa	3076	4054	4869	5705	6554	7403	1429	1898	2504	2925	3459	3934	91	165	258	363	477	619
Eastern Africa	3090	4172	5647	6751	7975	9197	1492	2145	2924	3710	4431	5140	52	111	228	412	649	940
Middle Africa	1911	2730	3693	4553	5445	6336	562	983	1720	2155	2816	3533	26	56	115	204	309	440
Northern Africa	4439	6227	7347	8768	10150	11531	1401	2267	3319	3870	4724	5612	213	391	749	1053	1435	1936
Southern Africa	1492	2121	2727	3339	3953	4566	1161	1567	2023	2326	2555	2832	124	150	207	260	305	337
Northern America	*23875*	*26687*	*27608*	*25597*	*27434*	*31287*	*18958*	*22616*	*25530*	*27243*	*25345*	*26164*	*5512*	*7529*	*9923*	*12206*	*14819*	*15156*
tin America	*19900*	*25622*	*32796*	*38833*	*45035*	*51263*	*9503*	*13488*	*18475*	*23034*	*27431*	*31474*	*1575*	*2578*	*4321*	*6201*	*8250*	*9923*
Tropical South America	9648	12705	16281	19621	23007	26393	4374	6610	9664	12053	14577	16959	840	1450	2747	3981	5206	6019
iddle America (mainland)	4566	6383	8874	10696	12740	14783	2187	3149	4302	5478	6518	7441	242	406	687	1110	1642	2240
emperate South America	3597	4091	4621	5164	5516	5890	1827	2313	2837	3519	4119	4626	360	540	644	792	1006	1180
Caribbean	2089	2443	3020	3352	3772	4197	1115	1416	1672	1984	2217	2448	133	182	243	318	396	484
Oceania	*1770*	*2007*	*2304*	*2355*	*2653*	*3056*	*1048*	*1338*	*1601*	*1943*	*2113*	*2357*	*219*	*320*	*454*	*610*	*796*	*949*
Australia and New Zealand	1489	1665	1879	1860	2085	2418	917	1157	1364	1664	1781	1973	211	306	428	571	745	884
elanesia	149	180	225	263	305	347	74	92	113	133	158	180	1	4	9	12	17	25
ynesia and Micronesia	132	162	200	232	263	291	57	89	124	146	174	204	7	10	17	27	34	40

[a] Excluding mainland region.

TABLE 29. NUMBER OF PUPILS ENROLLED, BY AGE GROUP, REGION AND YEAR; BOYS

(Thousands)

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	*111514*	*134316*	*155668*	*173129*	*194633*	*219402*	*61339*	*82580*	*99233*	*113556*	*123936*	*136983*	*13318*	*19391*	*25428*	*32579*	*40106*	*45334*
More developed regions	51720	54142	56412	55333	58495	63709	37238	47380	51365	55316	55120	58110	9366	13272	16296	20300	24923	27616
Less developed regions	59794	80174	99256	117796	136138	155693	24101	35200	47868	58240	68816	78873	3952	6119	9132	12279	15183	17718
Asia[a]	*49092*	*62525*	*75427*	*88942*	*102206*	*116485*	*20524*	*28900*	*35879*	*42779*	*50061*	*57023*	*3397*	*5078*	*7038*	*8602*	*9912*	*11168*
East Asia	*9880*	*9505*	*10010*	*10521*	*11465*	*12441*	*5998*	*7318*	*7003*	*7805*	*8660*	*9686*	*879*	*1249*	*1793*	*1882*	*2239*	*2616*
Japan	6373	4994	4855	5282	5845	6204	4728	5637	4511	4481	4994	5544	610	888	1264	1153	1203	1459
Other East Asia	3507	4511	5155	5239	5620	6237	1270	1681	2492	3324	3666	4142	269	361	529	729	1036	1157
South Asia	*39212*	*53020*	*65417*	*78421*	*90741*	*104044*	*14526*	*21582*	*28876*	*34974*	*41401*	*47337*	*2518*	*3829*	*5245*	*6720*	*7673*	*8552*
Middle South Asia	26206	36075	44358	53706	62614	72522	9108	14231	19047	22817	26902	30665	1567	2370	3310	4342	4870	5224
South-East Asia	10452	13477	16718	19478	22003	24512	4058	5470	7276	8976	10690	12253	659	1016	1320	1553	1746	2070
South-West Asia	2554	3468	4341	5237	6124	7010	1360	1881	2553	3181	3809	4419	292	443	615	825	1057	1258
Europe	*19541*	*20574*	*21697*	*22769*	*23937*	*25023*	*13450*	*15914*	*17744*	*19829*	*21544*	*23344*	*3239*	*4533*	*5644*	*7100*	*8949*	*10611*
Western Europe	6127	6399	7158	7500	7722	7985	4771	5359	5892	7026	7436	7464	1018	1382	1816	2191	2915	3475
Southern Europe	5353	5868	6461	6961	7367	7659	2748	3533	4175	4960	5808	6639	867	1241	1693	2058	2546	3072
Eastern Europe	4655	4842	4274	4285	4605	4855	3397	4461	4929	4613	4577	5123	861	1220	1253	1731	1998	2082
Northern Europe	3406	3465	3804	4023	4243	4524	2534	2561	2748	3230	3723	4118	493	690	882	1120	1490	1982
USSR	*11091*	*12112*	*12541*	*10654*	*10841*	*12268*	*7998*	*12543*	*13923*	*14496*	*12612*	*12494*	*1733*	*2717*	*2820*	*4043*	*5119*	*5579*
Africa	*8672*	*11589*	*14246*	*16874*	*19547*	*22216*	*4075*	*5859*	*8086*	*9556*	*11332*	*13091*	*394*	*678*	*1166*	*1647*	*2227*	*2940*
Western Africa	1947	2461	2988	3429	3916	4403	1028	1298	1661	1961	2306	2643	75	134	207	294	396	524
Eastern Africa	1906	2440	3185	3736	4346	4955	1037	1443	1925	2411	2888	3380	40	86	173	311	484	702
Middle Africa	1267	1764	2224	2697	3165	3632	427	720	1186	1402	1771	2150	20	46	97	158	229	313
Northern Africa	2828	3887	4507	5362	6161	6959	992	1603	2289	2578	3033	3420	173	305	546	712	921	1190
Southern Africa	724	1037	1342	1650	1959	2267	591	795	1025	1204	1334	1498	86	107	143	172	197	211
Northern America	*12125*	*13541*	*14039*	*13071*	*14011*	*15980*	*9630*	*11509*	*13035*	*13866*	*12935*	*13355*	*3405*	*4607*	*5902*	*7165*	*8578*	*8704*
Latin America	*10068*	*12926*	*16517*	*19588*	*22707*	*25834*	*5091*	*7143*	*9707*	*11989*	*14312*	*16423*	*981*	*1535*	*2519*	*3577*	*4747*	*5654*
Tropical South America	4865	6401	8147	9814	11482	13150	2338	3468	4978	6112	7376	8562	519	856	1552	2193	2823	3146
Middle America (mainland)	2333	3210	4516	5454	6493	7531	1241	1784	2454	3113	3720	4267	171	285	483	774	1148	1574
Temperate South America	1820	2064	2319	2604	2794	2994	942	1169	1429	1761	2084	2340	216	296	347	424	540	636
Caribbean	1050	1251	1535	1716	1938	2159	570	722	846	1003	1132	1254	75	99	137	186	236	298
Oceania	*925*	*1049*	*1201*	*1231*	*1384*	*1596*	*571*	*712*	*859*	*1041*	*1140*	*1253*	*169*	*242*	*339*	*445*	*574*	*678*
Australia and New Zealand	770	857	961	953	1067	1240	490	608	723	883	951	1033	163	231	319	415	534	627
Melanesia	85	107	136	158	183	208	48	58	72	82	99	115	1	4	8	11	16	23
Polynesia and Micronesia	70	85	104	120	134	148	33	46	64	76	90	105	5	7	12	19	24	28

[a] Excluding mainland region.

TABLE 30 NUMBER OF PUPILS ENROLLED, BY AGE GROUP, REGION AND YEAR; GIRLS

(Thousands)

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	88661	107813	125920	139866	158002	178036	46888	63890	76274	88362	95917	106762	6680	11099	15475	20982	26855	31197
More developed regions	49779	52110	54226	52973	55836	60732	34566	44461	48394	52662	52277	55259	5315	8589	11270	14843	18749	21111
Less developed regions	38882	55703	71694	86893	102166	117304	12322	19429	27880	35700	43640	51503	1365	2510	4205	6139	8106	10086
Asia[a]	31477	41951	52134	62790	73342	83576	11158	16446	20362	25290	30542	35900	948	1810	2813	3752	4675	5721
East Asia	9062	8896	9448	10131	10984	11907	5044	6440	6100	6804	7665	8646	202	428	730	844	1023	1268
Japan	6112	4782	4639	5041	5563	5904	4383	5296	4347	4428	4782	5286	147	296	510	523	565	706
Other East Asia	2950	4114	4809	5090	5421	6003	661	1144	1753	2376	2883	3360	55	132	220	321	458	562
South Asia	22415	33055	42686	52659	62358	71669	6114	10006	14262	18486	22877	27254	746	1382	2083	2908	3652	4453
Middle South Asia	12388	19217	25023	31373	37561	43749	2877	5286	7627	10156	12877	15612	320	604	964	1461	1934	2467
South-East Asia	8547	11653	14734	17638	20428	22830	2641	3824	5344	6603	7853	9072	357	654	929	1191	1383	1574
South-West Asia	1480	2185	2929	3648	4369	5090	596	896	1291	1727	2147	2570	69	124	190	256	335	412
Europe	18765	19705	20802	21750	22747	23721	11808	14197	16094	18427	20146	21985	1626	2750	3803	5067	6590	8019
Western Europe	5888	6164	6920	7249	7371	7590	4413	5037	5552	6785	7069	7112	516	757	1026	1280	1729	2090
Southern Europe	5090	5595	6176	6606	6999	7280	1968	2735	3395	4260	5153	6094	336	617	970	1315	1793	2337
Eastern Europe	4535	4635	4073	4044	4318	4516	3070	4052	4559	4298	4323	4875	517	978	1232	1670	1915	1970
Northern Europe	3252	3311	3633	3851	4059	4335	2357	2373	2588	3084	3601	3904	247	398	575	802	1153	1622
[illegible]	10656	11642	11996	10189	10363	11726	7735	12168	13409	13891	12074	11953	1243	2302	2530	3688	4676	5133
Africa	5336	7715	10037	12242	14530	16817	1970	3001	4404	5430	6653	7960	112	195	391	645	948	1332
[illegible]	1129	1593	1881	2276	2638	3000	401	600	843	964	1153	1291	16	31	51	69	81	95
[illegible]	1184	1732	2462	3015	3629	4242	455	702	999	1299	1543	1760	12	25	55	101	165	238
[illegible]	644	966	1469	1856	2280	2704	135	263	534	753	1045	1383	6	10	18	46	80	127
[illegible]	1611	2340	2840	3406	3989	4572	409	664	1030	1292	1691	2192	40	86	203	341	514	746
[illegible]	768	1084	1385	1689	1994	2299	570	772	998	1122	1221	1334	38	43	64	88	108	126
[illegible]	11790	13146	13569	12526	13423	15307	9328	11107	12495	13377	12410	12809	2107	2922	4021	5041	6241	6452
Latin America	[illegible]	12696	16279	19245	22328	25429	4412	6345	8768	11045	13119	15051	594	1042	1802	2624	3503	4269
[illegible]	[illegible]	[illegible]	8134	9807	11525	13243	2036	3142	4686	5941	7201	8397	321	594	1195	1788	2383	2873
Middle America [illegible]	[illegible]	[illegible]	4358	5242	6247	7252	946	1365	1848	2365	2798	3174	71	121	204	336	494	666
Temperate South America	[illegible]	[illegible]	2302	2560	2722	2896	885	1144	1408	1758	2035	2286	144	244	297	368	466	544
Caribbean	[illegible]	[illegible]	[illegible]	1636	1834	2038	545	694	826	981	1085	1194	58	83	106	132	160	186
Oceania	[illegible]	[illegible]	[illegible]	1124	1269	1460	477	626	742	902	973	1104	50	78	115	165	222	271
Australia and New Zealand	[illegible]	[illegible]	[illegible]	977	1018	1178	427	549	641	781	830	940	48	75	109	156	211	257
[illegible]	[illegible]	[illegible]	[illegible]	105	122	139	26	34	41	51	59	65	0	0	1	1	1	2
[illegible]	[illegible]	[illegible]	[illegible]	112	127	143	24	43	60	70	84	99	2	3	5	8	10	12

[a] [illegible]

Table 31. Total number of pupils enrolled, all ages, by region and year

(Thousands)

Major areas and regions	Total 1960	Total 1965	Total 1970	Total 1975	Total 1980	Total 1985	Boys 1960	Boys 1965	Boys 1970	Boys 1975	Boys 1980	Boys 1985	Girls 1960	Girls 1965	Girls 1970	Girls 1975	Girls 1980	Girls 1985
World total	328400	419089	497998	568474	639449	717714	186171	236287	280329	319264	358675	401719	142229	182802	217669	249210	280774	315995
More developed regions	187984	219954	237963	251427	265400	286537	98324	114794	124073	130949	138538	149435	89660	105160	113890	120478	126862	137102
Less developed regions	140416	199135	260035	317047	374049	431177	87847	121493	156256	188315	220137	252284	52569	77642	103779	128732	153912	178893
Asia[a]	116596	156710	193653	232155	270738	309873	73013	96503	118344	140323	162179	184676	43583	60207	75309	91832	108559	125197
East Asia	31065	33836	35084	37987	42036	46564	16757	18072	18806	20208	22364	24743	14308	15764	16278	17779	19672	21821
Japan	22353	21893	20126	20908	22952	25103	11711	11519	10630	10916	12042	13207	10642	10374	9496	9992	10910	11896
Other East Asia	8712	11943	14958	17079	19084	21461	5046	6553	8176	9292	10322	11536	3666	5390	6782	7787	8762	9925
South Asia	85531	122874	158569	194168	228702	263309	56256	78431	99538	120115	139815	159933	29275	44443	59031	74053	88887	103376
Middle South Asia	52466	77783	100329	123855	146758	170239	36881	52676	66715	80865	94386	108411	15585	25107	33614	42990	52372	61828
South-East Asia	26714	36094	46321	55439	64103	72311	15169	19963	25314	30007	34439	38835	11545	16131	21007	25432	29664	33476
South-West Asia	6351	8997	11919	14874	17841	20759	4206	5792	7509	9243	10990	12687	2145	3205	4410	5631	6851	8072
Europe	68429	77673	85784	94942	103913	112703	36230	41021	45085	49698	54430	58978	32199	36652	40699	45244	49483	53725
Western Europe	22733	25098	28364	32031	34242	35716	11916	13140	14866	16717	18073	18924	10817	11958	13498	15314	16169	16792
Southern Europe	16362	19589	22870	26160	29666	33081	8968	10642	12329	13979	15721	17370	7394	8947	10541	12181	13945	15711
Eastern Europe	17035	20188	20320	20641	21736	23421	8913	10523	10456	10629	11180	12060	8122	9665	9864	10012	10556	11361
Northern Europe	12299	12798	14230	16110	18269	20485	6433	6716	7434	8373	9456	10624	5866	6082	6796	7737	8813	9861
USSR	40456	53484	57219	56961	55685	59153	20822	27372	29284	29193	28572	30341	19634	26112	27935	27768	27113	28812
Africa	20559	29037	38330	46394	55237	64356	13141	18126	23498	28077	33106	38247	7418	10911	14832	18317	22131	26109
Western Africa	4596	6117	7631	8993	10490	11956	3050	3893	4856	5684	6618	7570	1546	2224	2775	3309	3872	4386
Eastern Africa	4634	6428	8799	10873	13055	15277	2983	3969	5283	6458	7718	9037	1651	2459	3516	4415	5337	6240
Middle Africa	2499	3769	5528	6912	8570	10309	1714	2530	3507	4257	5165	6095	785	1239	2021	2655	3405	4214
Northern Africa	6053	8885	11415	13691	16309	19079	3993	5795	7342	8652	10115	11569	2060	3090	4073	5039	6194	7510
Southern Africa	2777	3838	4957	5925	6813	7735	1401	1939	2510	3026	3490	3976	1376	1899	2447	2899	3323	3759
Northern America	48345	56832	63061	65046	67598	72607	25160	29657	32976	34102	35524	38039	23185	27175	30085	30944	32074	34568
Latin America	30978	41688	55592	68068	80716	92660	16140	21605	28743	35154	41766	47911	14838	20083	26849	32914	38950	44749
Tropical South America	14862	20765	28692	35655	42790	49371	7722	10725	14677	18119	21681	24858	7140	10040	14015	17536	21109	24513
Middle America (mainland)	6995	9938	13863	17284	20900	24464	3745	5279	7453	9341	11361	13372	3250	4659	6410	7943	9539	11092
Temperate South America	5784	6944	8102	9475	10641	11696	2978	3529	4095	4789	5418	5970	2806	3415	4007	4686	5223	5726
Caribbean	3337	4041	4935	5654	6385	7129	1695	2072	2518	2905	3306	3711	1642	1969	2417	2749	3079	3416
Oceania	3037	3665	4359	4908	5562	6362	1665	2003	2399	2717	3098	3527	1372	1662	1960	2191	2464	2835
Australia and New Zealand	2617	3128	3671	4095	4611	5275	1423	1696	2003	2251	2552	2900	1194	1432	1668	1844	2059	2375
Melanesia	224	276	347	408	480	552	134	169	216	251	298	346	90	107	131	157	182	206
Polynesia and Micronesia	196	261	341	405	471	535	108	138	180	215	248	281	88	123	161	190	223	254

[a] Excluding mainland region.

Table 32. Percentage of girls in each age group, by region and year

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	*1965*	*1970*	*1975*	*1980*	*1985*	*1960*	*1965*	*1970*	*1975*	*1980*	*1985*	*1960*	*1965*	*1970*	*1975*	*1980*	*1985*
World total	*44.3*	*44.5*	*44.7*	*44.7*	*44.8*	*44.8*	*43.3*	*43.6*	*43.5*	*43.8*	*43.6*	*43.8*	*33.4*	*36.4*	*37.8*	*39.2*	*40.1*	*40.8*
More developed regions	49.0	49.0	49.0	48.9	48.8	48.8	48.1	48.4	48.5	48.8	48.7	48.7	36.2	39.3	40.9	42.2	42.9	43.3
Less developed regions	39.4	41.0	41.9	42.5	42.9	43.0	33.8	35.6	36.8	38.0	38.8	39.5	25.7	29.1	31.5	33.3	34.8	36.3
Asia[a]	*39.1*	*40.2*	*40.9*	*41.4*	*41.8*	*41.8*	*35.2*	*36.3*	*36.2*	*37.2*	*37.9*	*38.6*	*21.8*	*26.3*	*28.6*	*30.4*	*32.0*	*33.9*
East Asia	*47.8*	*48.3*	*48.6*	*49.1*	*48.9*	*48.9*	*45.7*	*46.8*	*46.6*	*46.6*	*47.0*	*47.2*	*18.7*	*25.5*	*28.9*	*31.0*	*31.4*	*32.6*
Japan	49.0	48.9	48.9	48.8	48.8	48.8	48.1	48.4	49.1	49.7	48.9	48.8	19.4	25.0	28.7	31.2	32.0	32.6
Other East Asia	45.7	47.7	48.3	49.3	49.1	49.0	34.2	40.5	41.3	41.7	44.0	44.8	17.0	26.8	29.4	30.6	30.7	32.7
South Asia	*36.4*	*38.4*	*39.5*	*40.2*	*40.7*	*40.8*	*29.6*	*31.7*	*33.1*	*34.6*	*35.6*	*36.5*	*22.9*	*26.5*	*28.4*	*30.2*	*32.2*	*34.2*
Middle South Asia	32.1	34.8	36.1	36.9	37.5	37.6	24.0	27.1	28.6	30.8	32.4	33.7	17.0	20.3	22.6	25.2	28.4	32.1
South-East Asia	45.0	46.4	46.8	47.5	48.1	48.2	39.4	41.1	42.3	42.4	42.4	42.5	35.1	39.2	41.3	43.4	44.2	43.2
South-West Asia	36.7	38.7	40.3	41.1	41.6	42.1	30.5	32.3	33.6	35.2	36.0	36.8	19.1	21.9	23.6	23.7	24.1	24.7
Europe	*49.0*	*48.9*	*48.9*	*48.9*	*48.7*	*48.7*	*46.7*	*47.1*	*47.6*	*48.2*	*48.3*	*48.5*	*33.4*	*37.8*	*40.3*	*41.6*	*42.4*	*43.0*
Western Europe	49.0	49.1	49.2	49.1	48.8	48.7	48.1	48.5	48.5	49.1	48.7	48.8	33.6	35.4	36.1	36.9	37.2	37.6
Southern Europe	48.7	48.8	48.9	48.7	48.7	48.7	41.7	43.6	44.8	46.2	47.0	47.9	27.9	33.2	36.4	39.0	41.3	43.2
Eastern Europe	49.3	48.9	48.8	48.6	48.4	48.2	47.5	47.6	48.1	48.2	48.6	48.8	37.5	44.5	49.6	49.1	48.9	48.6
Northern Europe	48.8	48.9	48.9	48.9	48.9	48.9	48.2	48.1	48.5	48.8	49.2	48.7	34.3	36.6	39.5	41.7	43.6	45.0
USSR	*49.0*	*49.0*	*48.9*	*48.9*	*48.9*	*48.9*	*49.2*	*49.2*	*49.1*	*48.9*	*48.9*	*48.9*	*41.8*	*45.9*	*47.3*	*47.7*	*47.7*	*47.9*
Africa	*38.1*	*40.0*	*41.3*	*42.0*	*42.6*	*43.1*	*32.6*	*33.9*	*35.3*	*36.2*	*37.0*	*37.8*	*22.1*	*22.3*	*25.1*	*28.1*	*29.9*	*31.2*
Western Africa	36.7	39.3	38.6	39.9	40.3	40.5	28.1	31.6	33.7	33.0	33.3	32.8	17.6	18.8	19.8	19.0	17.0	15.3
Eastern Africa	38.3	41.5	43.6	44.7	45.5	46.1	30.5	32.7	34.2	35.0	34.8	34.2	23.1	22.5	24.1	24.5	25.4	25.3
Middle Africa	33.7	35.4	39.8	40.8	41.9	42.7	24.0	26.8	31.0	34.9	37.1	39.1	23.1	17.9	15.7	22.5	25.9	28.9
Northern Africa	36.3	37.6	38.7	38.8	39.3	39.6	29.2	29.3	31.0	33.4	35.8	39.1	18.8	22.0	27.1	32.4	35.8	38.5
Southern Africa	51.5	51.1	50.8	50.6	50.4	50.4	49.1	49.3	49.3	48.2	47.8	47.1	30.6	28.7	30.9	33.8	35.4	37.4
Northern America	*49.2*	*49.3*	*49.1*	*48.9*	*48.9*	*48.9*	*49.2*	*49.1*	*48.9*	*49.1*	*49.0*	*49.0*	*38.2*	*38.8*	*40.5*	*41.3*	*42.1*	*42.6*
America	*49.4*	*49.6*	*49.6*	*49.6*	*49.6*	*49.6*	*46.4*	*47.0*	*47.5*	*48.0*	*47.8*	*47.8*	*37.7*	*40.4*	*41.7*	*42.3*	*42.5*	*43.0*
ical South America	49.6	49.6	50.0	50.0	50.1	50.2	46.5	47.5	48.5	49.3	49.4	49.5	38.2	41.0	43.5	44.9	45.8	47.7
le America (mainland)	48.9	49.7	49.1	49.0	49.0	49.1	43.3	43.3	43.0	43.2	42.9	42.7	29.3	29.8	29.7	30.3	30.1	29.7
perate South America	49.4	49.5	49.8	49.6	49.3	49.2	48.4	49.5	49.6	50.0	49.4	49.4	40.0	45.2	46.1	46.5	46.3	46.1
nbbean	49.7	48.8	49.2	48.8	48.6	48.6	48.9	49.0	49.4	49.4	48.9	48.8	43.6	45.6	43.6	41.5	40.4	38.4
Oceania	*47.7*	*47.7*	*47.9*	*47.7*	*47.8*	*47.8*	*45.5*	*46.8*	*46.3*	*46.4*	*46.0*	*46.8*	*22.8*	*24.4*	*25.3*	*27.0*	*27.9*	*28.6*
ustralia and New Zealand	48.3	48.5	48.9	48.8	48.8	48.7	46.6	47.5	47.0	46.9	46.6	47.6	22.7	24.5	25.5	27.3	28.3	29.1
nesia	43.0	40.6	39.6	39.9	40.0	40.1	35.1	37.0	36.3	38.3	37.3	36.1	0.0	0.0	11.1	8.3	5.9	8.0
sia and Micronesia	47.0	47.5	48.0	48.3	49.0	49.1	42.1	48.3	48.4	47.9	48.3	48.5	28.6	30.0	29.4	29.6	29.4	30.0

[a] xcluding mainland region

TABLE 33. ENROLMENT RATIOS, BY AGE RANGE, INCLUDING MAINLAND REGION OF EAST ASIA

Major areas and regions	6-11 years						12-17 years						18-29 years					
	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985	1960	1965	1970	1975	1980	1985
World total	66.8	71.7	75.5	75.8	75.1	74.9	39.3	45.1	49.0	52.7	53.4	53.4	4.2	6.0	7.3	8.2	9.2	9.5
More developed regions	90.5	91.3	93.0	94.2	94.5	94.5	77.8	82.2	86.4	90.8	93.1	95.2	8.2	12.1	14.0	15.9	18.8	20.8
Less developed regions	58.2	65.3	70.2	71.1	70.5	70.3	25.3	31.1	36.3	40.6	42.6	43.2	2.5	3.5	4.7	5.3	5.9	6.0
Asia	64.9	71.2	75.9	76.4	75.7	76.3	28.8	34.4	38.4	43.1	45.4	46.2	2.7	3.8	4.9	5.3	5.8	5.9
East Asia	88.8	91.8	97.0	98.9	98.9	98.9	39.2	45.9	50.6	58.9	66.2	71.0	3.6	5.0	6.6	7.2	8.3	8.8
Mainland region	87.3	91.1	96.8	98.8	98.8	98.8	34.0	40.8	47.2	56.0	63.6	68.7	3.6	4.9	6.5	7.2	8.3	8.6
South Asia	45.0	54.7	60.9	62.2	62.3	64.1	19.2	24.5	28.6	31.5	32.1	31.5	1.9	2.8	3.4	3.8	3.8	3.8

NOTE: Estimates are provided of the enrolment ratios for the world, more developed regions, less developed regions and Asia, based on estimates for all the 24 United Nations regions (all other tables in this report exclude the mainland region of East Asia). The education data available for the mainland region were very limited. However, some partial data available for primary education suggested enrolment ratios of the same magnitude as those of the region Other East Asia. The above estimations have therefore been based on the assumption that the mainland region had and will continue to have the same enrolment ratios as the region Other East Asia for the whole period covered here.

ANNEX IV

Composition of major areas and regions[a]

Asia

East Asia

- Mainland region
  - China
  - Hong Kong
  - Macau
  - Mongolia
- Japan *
- Other East Asia
  - Democratic People's Republic of Korea
  - Republic of Korea

South Asia

- Middle South Asia
  - Afghanistan
  - Bangladesh
  - Bhutan
  - India
  - Iran
  - Maldives
  - Nepal
  - Pakistan
  - Sikkim
  - Sri Lanka
- South-East Asia
  - Brunei
  - Burma
  - Democratic Republic of Viet-Nam
  - Indonesia
  - Khmer Republic
  - Laos
  - Malaysia
  - Philippines
  - Portuguese Timor
  - Republic of Viet-Nam
  - Singapore
  - Thailand
- South-West Asia
  - Bahrain
  - Cyprus
  - Democratic Yemen
  - Iraq
  - Israel
  - Jordan
  - Kuwait
  - Lebanon
  - Oman
  - Palestine-Gaza Strip
  - Qatar
  - Saudi Arabia
  - Syrian Arab Republic
  - Turkey
  - United Arab Emirates
  - Yemen

Europe

- Western Europe *
  - Austria
  - Belgium
  - France
  - Germany, Federal Republic of
  - Liechtenstein
  - Luxembourg
  - Monaco
  - Netherlands
- Southern Europe *
  - Albania
  - Andorra
  - Gibraltar
  - Greece
  - Holy See
  - Italy
  - Malta
  - Portugal
  - San Marino
  - Spain
  - Yugoslavia
- Eastern Europe *
  - Bulgaria
  - Czechoslovakia
  - German Democratic Republic
  - Hungary
  - Poland
  - Romania
- Northern Europe *
  - Channel Islands
  - Denmark
  - Faroe Islands
  - Finland
  - Iceland
  - Ireland
  - Isle of Man
  - Norway
  - Sweden
  - United Kingdom
- Union of Soviet Socialist Republics *

Africa

- Western Africa
  - Cape Verde Islands
  - Dahomey
  - Gambia
  - Ghana
  - Guinea
  - Guinea-Bissau
  - Ivory Coast
  - Liberia
  - Mali
  - Mauritania
  - Niger
  - Nigeria
  - St Helena
  - Senegal
  - Sierra Leone
  - Togo
  - Upper Volta
- Eastern Africa
  - British Indian Ocean Territory
  - Burundi
  - Comoro Islands
  - Ethiopia
  - French Territory of the Afars and the Issas
  - Kenya
  - Madagascar
  - Malawi
  - Mauritius
  - Mozambique
  - Réunion
  - Rwanda
  - Seychelles
  - Somalia
  - Southern Rhodesia
  - Uganda
  - United Republic of Tanzania
  - Zambia
- Middle Africa
  - Angola
  - Central African Republic
  - Chad
  - Congo
  - Equatorial Guinea
  - Gabon
  - São Tomé and Principe
  - United Republic of Cameroon
  - Zaire
- Northern Africa
  - Algeria
  - Egypt
  - Libyan Arab Republic
  - Morocco
  - Spanish North Africa
  - Spanish Sahara
  - Sudan
  - Tunisia
- Southern Africa
  - Botswana
  - French Southern and Antarctic Territories
  - Lesotho
  - Namibia
  - South Africa
  - Swaziland

America

- Northern America *
  - Bermuda
  - Canada
  - Greenland
  - St. Pierre and Mi
  - United States of A
- Latin America
  - Tropical South Ame
    - Bolivia
    - Brazil
    - Colombia
    - Ecuador
    - French Guiana
    - Guyana
    - Peru
    - Surinam
    - Venezuela
  - Middle America (
    land)
    - Belize
    - Costa Rica
    - El Salvador
    - Guatemala
    - Honduras
    - Mexico
    - Nicaragua
    - Panama Canal Zo
  - Temperate South An
    - Argentina
    - British Antarctic
      tory
    - Chile
    - Falkland Islands (l
      nas)
    - Paraguay
    - Uruguay
  - Caribbean
    - Antigua
    - Bahamas
    - Barbados
    - British Virgin Isl
    - Cayman Islands
    - Cuba
    - Dominica
    - Dominican Repub
    - Grenada
    - Guadeloupe
    - Haiti
    - Jamaica
    - Martinique
    - Montserrat
    - Netherlands Antill
    - Puerto Rico
    - St. Kitts-Nevis-Ang
    - St. Lucia
    - St. Vincent
    - Trinidad and Tob
    - Turks and Caico
      lands
    - United States
      Islands

[a] Regions classified as "more developed regions" are marked with an asterisk.

Oceania

Australia and New Zealand *
- Australia
- New Zealand

Melanesia
- British Solomon Islands

Oceania (continued)

- New Caledonia
- New Hebrides
- Norfolk Island
- Papua New Guinea

Polynesia and Micronesia
- American Samoa

Oceania (continued)

- Cook Islands
- Fiji
- *French Polynesia*
- Gilbert and Ellis Islands
- Guam
- Nauru
- Niue Island

Oceania (continued)

- Pacific Islands Tr Territory
- *Tonga*
- Wallis and Futuna lands
- Western Polynesia

THE DEMOGRAPHIC TRANSITION*

*Ansley J. Coale***

1. The subject of this paper is familiar—perhaps over-familiar. However, because in the three or four decades since the idea of the demographic transition was fully formulated and designated by that name there has been an unprecedented flood of demographic research and profound changes in birth and death rates in most populations of the world, it may be of interest to *re-examine the subject to see whether the basic ideas* of the transition are as valid and germane in the contemporary world as they seemed to be when they first became popular.

THE DEMOGRAPHIC TRANSITION IN THE WORDS OF ITS ORIGINATOR

2. The easiest way to summarize the ideas of the demographic transition is to quote from one of its formulators:

"[Pre-modern birth rates in Europe] although ... lower than in Colonial America, or in the Orient today ... were high by present standards. Indeed, they had to be high. We may take it for granted that all populations surviving to the modern period in the face of inevitably high mortality had both the physiological capacity and the social organization necessary to produce high birth rates.

"Peasant societies in Europe, and almost universally throughout the world, are organized in ways that bring strong pressures on their members to reproduce. The economic organization of relatively self-sufficient agrarian communities turns almost wholly about the [illegible]

[illegible] insecure and unimportant. The individual's status in life tends to be that to which he is born. There is, therefore, rather little striving for advancement. Education is brief, and children begin their economic contributions early in life. In such societies, more- [illegible] functions are organized in ways that are compatible with continuous childbearing.

"These arrangements, which stood the test of experience throughout the centuries of high mortality, are strongly supported by popular beliefs, formalized in religious doctrine, and enforced by community sanctions. They are deeply woven into the social fabric and are slow to change. Mortality dropped rather promptly in response to external changes *because mankind has always coveted health* The decline of fertility, however, awaited the gradual obsolescence of age-old social and economic institutions and the emergence of a new ideal in matters of family size.

"The new ideal of the small family arose typically in the urban industrial society. It is impossible to be precise about the various causal factors, but apparently many were important. Urban life stripped the family of many functions in production, consumption, recreation, and education. In factory employment the individual stood on his own accomplishments. The new mobility of young people and the anonymity of city life reduced the pressures toward traditional behaviour exerted by the family and community In a period of rapidly developing technology new skills were needed, and new opportunities for individual advancement arose. Education and a rational point of view became increasingly important. As a consequence the cost of child-rearing grew and the possibilities for economic contributions by children declined Falling death rates at once increased the size of the family to be supported and lowered the inducements to have many births Women, moreover, found new independence from household obligations and new economic roles less compatible with child-rearing.

"Under these multiple pressures old ideals and beliefs began to weaken, and the new ideal of a small number of children gained strength. A trend toward birth restriction started in the urban upper classes and gradually moved down the social scale and out to the countryside. For the most part this restriction of childbearing was accomplished by the use of folk methods of contraception that have been widely known for centuries throughout the world However, they were not widely used until the incentive for birth restriction became strong Later, presumably in response to the ne[illegible] demands, the modern and more effi[illegible] th[illegible] ntraception were developed and [illegible] cceptance.

[illegible]

By the middle nineteen-thirties birth rates throughout the modern West had reached very low levels. The transition to an efficient recruitment of life on the basis of low birth rates and low death rates was virtually completed." [1]

Certain features of fertility trends during the demographic transition re-examined

3. In reviewing the transition, no attempt is made to consider all the points that have been challenged by later writers, or that are not fully consistent with evidence now available. In particular, the controversy about whether declining mortality was the principal basis of accelerated population growth in the late eighteenth and early nineteenth centuries, and about the causes of declining mortality will not be reviewed. Instead, consideration is given to the adequacy of the attempts of the demographic transition to describe and, to some extent, to explain trends of fertility during modernization.

4. In discussing fertility in the context of the transition, it is convenient to use indexes that were designed for a reasearch project in which the province-by-province decline of fertility in Europe is being studied, a project conducted by the staff of the Office of Population Research in Princeton in collaboration with several European colleagues. The indexes have been fully defined elsewhere [2] and are merely described in a few words here. The indexes measure the over-all fertility of women of childbearing age (I_f), the fertility of the currently married women (I_g), and the non-married (I_h). Each of these indexes states the fertility of the specified group in relation to what it would experience if it had the highest set of fertility rates by age on reliable record (that of married Hutterites). Thus, an index of 1.0 means that the group in question (e.g., all women or married women) has fertility equal to the highest on record; a value of 0.5 implies fertility on average half as high as the Hutterites etc. The index of proportion married (I_m) is a fertility-weighted aggregate index of nuptiality among women of childbearing age; if all women from 15 to 50 are married, the index has a value of 1.0. The advantage of these indexes over direct calculations of general fertility, marital fertility and the simple proportion married among women 15 to 50 is that the indexes incorporate an indirect standardization for age distribution within the childbearing span and that the value of the fertility indexes has a direct intuitive meaning (i.e., fertility is stated in relation to the maximum on record). There is a useful relation among the indexes:

$$I_f = I_m \cdot I_g + (1.0 - I_m)I_h$$

which reduces to $I_f = I_m \cdot I_g$ when the contribution of illegitimate fertility is negligible.

5. Next to be considered are certain aspects of fertility trends that appear inconsistent with, or at least more complex than, the description of fertility changes provided in the demographic transition.

Large differences in the fertility of pre-modern societies

6. In the statement of the transition quoted earlier, the characterization of fertility in traditional societies is not very specific, and certainly does not do justice to the large range in fertility among populations classed together as pre-modern. Total fertility was as low as 5.0 in early nineteenth-century Sweden and mid-nineteenth-century England and as high as 8.4 in the Cocos-Keeling Islands and well over 8.0 in a number of African populations, according to the best available estimates. The difference between the highest and lowest pre-transition fertility levels is a magnitude comparable to the change in fertility during the transition itself. Incidentally, in none of the fairly voluminous data now available from "traditional" populations is there an example of fertility that approaches the biological maximum, as implied in some statements of the transition. A total fertility of 8.4 implies an I_f of about 0.67. A population in which all women of childbearing age were married and in which marital fertility equaled that of the Hutterites would have an I_f of 1.0; the Hutterites themselves, with only about 70 per cent of women of childbearing age married ($I_m = 0.7$), have an I_f of 0.70. An I_f of 1.0 is "biologically possible", but the highest values found are about 0.7.

Differences in proportions married in pre-modern societies

7. One source of large differences in fertility among populations that have not experienced the transition is differences in proportions married at the childbearing ages. Differences in marital status are especially conspicuous between the population of western Europe before the modern decline in fertility, on the one hand, and populations of Asia and tropical Africa, on the other. [3] In western Europe in the nineteenth century, the mean age at first marriage for women was usually above 23 years and sometimes as high as 28 or 29; the proportion remaining single at the upper end of the childbearing span was typically more than 10 per cent and sometimes 25 or 30 per cent or more. In the traditional societies of Asia and Africa, the mean age at first marriage for women is usually less than 20 years; the proportion remaining single at age 35 or 40 is

[1] Frank W. Notestein, "Economic problems of population change", in *Proceedings of the Eighth International Conference of Agri-Economists* (London, Oxford University Press, 1953).

[2] Ansley J. Coale, "Factors associated with the development of low fertility: a historic summary", in *Proceedings of the World Population Conference, 1965*, vol. II, *Fertility, Family Planning, Mortality* (United Nations publication, Sales No. 66.XIII.6), pp. 205-209.

[3] John Hajnal, "European marriage studies in perspective", in D. V. Glass and D. E. C. Eversley, eds., *Population in History* (London, Arnold, 1964).

usually less than 5 per cent, and often less than 1 per cent. Eastern Europe, North America, Latin America and the European populations of Oceania are intermediate in the prevalence of marriage.

8. Differences in the marital status of women in the potentially fertile ages are succinctly expressed by the index of proportion married (I_m) described above. The highest value of I_m that has been computed for a national population is 0.91 for Korea in 1930, the lowest is 0.33 for Ireland in 1900. In north-western Europe—the United Kingdom, Scandinavia, the low countries, plus Germany, Switzerland and Austria—I_m prior to the modern decline in fertility was between 0.35 and 0 50, about half the level found in Korea

9. There is reason to believe that this western European form of nuptiality had not existed continuously since the fall of Rome, but rather that late marriage and frequent permanent celibacy were developments occurring after the Middle Ages. It might be said that western Europe has experienced two demographic transitions. The first—the extent, date duration and some might say even the existence of which are conjectural—was a transition from early and universal marriage to the west European form of nuptiality; a reduction in proportion married from an I_m of 0 75 to 0 85 to an I_m of 0.40 to 0 50. If I_g remained constant during this transition, the fall in I_f was as much as from 30 to 50 per cent. This first transition might be con- [illegible]

for continued human progress, advocated still higher age at marriage (still lower I_m) as the solution. The second transition (the transition that is the subject here) could then be called the Neomalthusian transition, since it is based on a reduction of I_g by techniques advocated by Neomalthusians.

10. The Malthusian transition had demographic consequences—on the rate of increase and the age composition of the population—comparable to the later demographic transition that is the subject of this paper. But later marriage is a different kind of response from the voluntary reduction of marital fertility, and arises from a different set of social forces. Couples marry within a range of socially accepted ages and postpone marriage within that range because of inability to satisfy the current norms (e g, of dowry, property ownership or income) for marriage. Few couples marry at 25 instead of 24 because of a calculation that they will have one birth less, whereas the practice of contraception or abortion has as its direct objective fewer births.

11. It appears likely that even in eastern Europe, the marriage state had become less universal in the late nineteenth century than several centuries earlier, because I_m, generally above 0.60 and thus well above what was then characteristic of the north-western part of Europe, was still short of the range from 0.75 to 0.90 of many Asian and African populations.

12. The geographical pattern of nuptiality in Russia in 1897 is of particular interest. I_m was below 0.55 in the four provinces bordering on the Baltic; but as one moves across the map of Russia in any direction from the Baltic, one finds ever larger values of I_m, reaching a maximum in the opposite (south-east as opposed to north-west) corner of European Russia—a maximum of about 0 80 in the province bordering the Caspian. A simple measure of "distance" from the Baltic—the minimum number of provinces that must be traversed to reach the Baltic—has a linear correlation of 0.92 with I_m. This tight-knit geographical pattern suggests that within the Russian Empire at the end of the nineteenth century the custom of late marriage was still spreading from its hypothetical point of introduction in the most Europeanized provinces (the Baltic) through neighbouring areas to the most distant part, still essentially Asian in terms of age at marriage

Differences in marital fertility in pre-transition populations

13. The variation in the prevalence of marriage is not the only source of differences in fertility among populations not yet subject to the prolonged decline of the transition. The index of marital fertility (I_g) in provinces of pre-transition Europe ranges from about 0.65 to nearly 1 0 (or as high as among the Hutterites). In India, even if an estimate of the birth rate well above that of the Registrar General is accepted, I_g during the 1950s was less than 0 60. The highest marital fertility in pre-transition populations is at least 50 per cent higher than the lowest The basis of these differences is far from fully understood, although they have been the subject of speculation and of research limited by the data at hand

14 A useful distinction was introduced by Louis Henry: the distinction between natural fertility and controlled fertility [4] By his definition, natural fertility is what prevails in a population in which the couple's behaviour is not modified according to the number of children ever born; control is indicated by special measures taken by couples with many children. Thus, Henry considers natural the low fertility that may exist in a society that observes a taboo against intercourse during lactation, provided the taboo is invoked after the first birth as well as after the ninth In a study of examples of what seemed on the basis of available clues to be natural fertility, he found a substantial range in level; among the marital fertility schedules he tabulates as natural, the range of I_g (where the underlying data are reliable) is from 0 64 to 1.0.

15. Some, but not all, pre-modern societies are characterized by natural fertility (in this sense). The presence or absence of control is difficult to establish since there is no direct way of ascertaining the extent of the practice of contraception and abortion in European

[4] Louis Henry, "Some data on natural fertili[illegible]" *Eugenics Quarterly*, vol. 8, No 2 (1961).

populations more than a century ago. But control is indicated, crudely, by a steeply declining age schedule of marital fertility and more precisely by such clues as a substantially earlier age at the birth of the last child for women who married under age 25 than for those who married over 30. Low fertility caused by control has been detected in selected French villages before the end of the eighteenth century, among the dukes and peers of France and the *bourgeoisie* of Geneva as early as the seventeenth century, in a parish in Devonshire in the seventeenth century, and among Quakers in Colonial America by such evidence. The age structure of marital fertility suggests the presence of control in several national populations prior to the sustained modern decline.

Variations in fertility in fully modernized societies

16. In the 1930s and 1940s when the demographic transition was becoming well known, fertility in the most highly modernized countries was—or had recently been—below replacement. That is to say, births were occurring at a rate insufficient to replace the parental generation. Fertility too low to maintain a constant population was viewed as the natural result of the transition. This view was supported, not merely by the fact that low fertility was so widespread in the 1930s, but by an attempt to predict the implications of the universal extension of effective birth control. Thus, Stix and Notestein wrote:

> "No population, even under favourable mortality conditions, can maintain itself without an appreciable proportion of large families to counterbalance the unmarried, the married but sterile, and the couples who are unable to have more than one or two children. On the other hand, planned families of more than five children are rare. Estimates indicate that if populations are to be self-replacing more than 30 per cent of all married couples must have families of four or more children. It is doubtful if that proportion is approached in any group actually planning its families. Our own experience and that of western Europe point clearly to the fact that voluntary parenthood will result in eventually declining numbers unless new factors enter the situation." [5]

17. In fact, from the 1940s through the 1960s, there was a "baby boom" of varying magnitude in precisely those areas (western Europe and America north of the Rio Grande) that exemplified the likeiihood of decline. During this boom, fertility remained above the level required for replacement, at least until the 1970s. The anticipated period of decline in population turned into a period of unexpected rapid growth—in western Europe, post-war rates of increase were as high as during the transition itself.

18. A major part of this unexpected increa fertility was the result of the rather sudden termi of the long-standing western European combinat late marriage and high rates of permanent cel Average age at first marriage fell by as much a or three years, and the proportion remaining sin less than 10 per cent in most populations. The va I rose from around or below 0.50 to values of 0. 0.70. In France and the low countries I_m beg increase (quite gradually) no later than the mid the nineteenth century, and the increase conti except for the temporary effects of the First and S World Wars, into the 1950s. In most of the European populations (and in overseas areas pop by Europeans), the increase in I_m began in the 193 spite of the depression) or in the 1940s and was and rapid.

19. Other factors contributing to the "baby b were a pronounced decrease in childlessness (belo previously estimated minimal incidence of involu sterility, in some populations) and in the proporti couples who stop childbearing with one child. was no general return to large families. It became that the nuptiality customs of Malthus' time, alth remarkably stable for more than a century, wer permanent features of western society, and that p ences for very small families evident among co controlling fertility in the first decades of the twe century were also temporary. In short, counter-exa promptly came to life to disprove the proposition no population can maintain itself without an appre proportion of large families to counterbalance unmarried, the sterile etc. The unmarried, the s and the one-child family virtually vanished durin period after the Second World War.

The decline in mortality does not alwa precede the decline in fertility

20. Descriptions of the demographic trans attributed the rapid growth of European popula during the nineteenth and early twentieth centuri a decline in mortality that preceded the decline in tility, a lag explained by the lesser resistence to ernization of the forces sustaining high mortality those maintaining high fertility. A further reason the decline in mortality naturally precedes the de in fertility is that a fall in death rates, especially am children, is itself a basis for a reduction in fertility: lower mortality, given goals of size of family achieved with fewer children; more survivors fro given number of births constitute a greater burde child care; lower mortality can help nurture a gr concern for the individual child, a concern that in contributes to the control of fertility.

21. A closer look at the evidence reveals m instances in which the decline in fertility and mort were more or less synchronous (without the postul lag) and even a number of populations in which decline in fertility came first. France is the most pro

[5] Regine K. Stix and Frank W. Notestein, *Controlled Fertility: An Evaluation of Clinic Service* (Baltimore, Williams and Wilkins, 1940).

nent example of roughly simultaneous declines: the moderate rate of population increase established in the late eighteenth century scarcely accelerated during the transition, because the decline in the death rate during the nineteenth century was very well matched by a decline of the birth rate that occurred at the same time.

22. The modern decline in mortality in Germany began at the same time as the decline in fertility. Knodel has shown that trends in infant mortality were essentially horizontal until after 1870 and then diminished in remarkable parallelism with the fall in marital fertility. The inference of a causal relation is almost irresistible; but when province-by-province records are examined, it is found that in about half the provinces the decline in fertility preceded the decline in infant mortality, so it is an open question which trend is the cause and which the effect or whether indeed it is not an instance of common causes of both trends.

The decline in marital fertility during the transition. Result of new techniques of contraception or of newly developed attitudes and motives

23. One of the most carefully reasoned and persuasive aspects of the demographic transition was its [illegible] to be false by demonstrating that conception rates were as high, and birth intervals as short, in modern populations when not practising contraception as in primitive populations. Technological explanations—that the decline in marital fertility occurred because of the invention of effective contraceptives—were countered by the historical evidence assembled by Norman Himes of the centuries' old existence of knowledge of folk methods of contraception, combined with clinical evidence of the effectiveness of such methods, especially *coitus interruptus.*[6] It was also pointed out that the decline in fertility began before the wholesale manufacture and distribution of early new contraceptive devices, such as condoms and diaphragms.

24. Recent analyses cast doubt on the overriding importance of changing attitudes and the secondary importance of the new availability of effective contraceptive technology. Surveys in the United States of America show a surprisingly large fraction of pregnancies to be unintended and unwanted, even in the 1960s. In many high fertility populations (notably in urban Latin America) women are so highly motivated to avoid birth that they resort to primitive methods of self-induced abortion, or put themselves in the hands of non-medically trained abortionists, with resulting high rates of hospitalization and many deaths These facts suggest that strong motivation is not enough: the mastery of technique is also important It is also natural to infer that improvement in contraceptive practice, even if only in the form of the development of more effective use of folk methods, is usually an important ingredient in sharp declines in marital fertility

25. The most telling evidence suggesting that in the nineteenth century new techniques must have become available to persons who strongly preferred to avoid childbirth is the decline in the fertility of unmarried women that took place during the same era as the fall in marital fertility. In many European populations, the proportionate decline in illegitimate fertility (I_h) from the mid-nineteenth century until about 1930 was about the same as in legitimate fertility [7] It can scarcely be argued that single women (and their mates) developed *a new attitude and sought to avoid illegitimate births* that previously they had welcomed. A much more natural reading of the evidence is that newly adopted procedures (and newly developed skills in their use) that permitted married couples to realize their (possibly new) intentions to have fewer children also permitted cohabiting unmarried couples to avoid illegitimate births *Coitus interruptus* might always have been known to some, but mistaken beliefs about the consequences of its practice, plus restriction of knowledge to a minority, may have inhibited its use

Regional differences in the decline in fertility

26 In the continuing research on the conditions that prevailed in each of the more than 700 provinces of Europe as marital fertility declined, it is becoming evident that there are differences in the experience of provinces in different countries or regions, differences that cannot be explained by recorded socio-economic characteristics. If a very close empirical relationship is found in one European country between the date at which marital fertility began to declin and certain socio-economic characteristics (say, the proportion of the labour force in agriculture and the level of infant mortality), the relationship cannot, in general, be used to estimate the date of decline in another country The same socio-economic characteristics may be related to the date of decline in a second country (although such is generally not the case), but the parameters of the estimating equation are different.

27. The strong difference from region to region in the conditions under which fertility declines was first noticed in Leasure's research on his doctoral dissertation, a study of change in fertility in Spain.[8] At one stage in his work, he drew a map in which a code indicated the level of marital fertility in 1910 in each

[6] Norman E. Himes, *Medical History of Contraception* (Baltimore, Williams and Wilkins, 1936)

[7] Edward Shorter, John Knodel and Etienne van de Walle, [illegible]

of the 49 provinces of Spain. It was very evident that provinces with similar levels of marital fertility were adjacent, rather than spotted through the country. Adjacent provinces with similar levels of fertility were often quite dissimilar in the extent of literacy, the proportion of the labour force in agriculture and the like. Leasure took his map, without a label, but with its various shadings, to a professor of romance languages at Princeton who specialized in Spanish language, literature and culture, to ask help in interpreting the clusters that appeared on the map. His immediate reaction was that Leasure had drawn a linguistic map of Spain. When Spain is divided into the standard regions that are used by Spanish statistical authorities, regions delineated in part because they once constituted different kingdoms and differ in language and traditions, analysis of variance shows that over 90 per cent of the total variance in marital fertility is between regions, and less than 10 per cent within. Similar results have been found by Knodel in Germany.

28. A vivid example of what might be called regional clustering of fertility change is found in Belgium. In an exploratory phase of research on the decline of fertility in Belgium by commune, Ronald Lesthaeghe has found structurally similar multivariate relations between fertility on the one hand and a set of socio-economic variables on the other in the French-speaking and Flemish-speaking parts of the country. The two linear regressions are separate and if the two parts of Belgium are thrown together as one set of observations, the relationships are generally weakened, regression coefficients reversed in sine and the statistical picture becomes confused, if not meaningless.

The generalization that remains

29. In spite of the foregoing objections, qualifications and doubts concerning particular points in the demographic transition, there remains an over-all generalization that can hardly be denied. In Paul Demeny's words, "In traditional societies fertility and mortality are high. In modern societies fertility and mortality are low. In between, there is demographic transition."[9] It is not at all impossible to formulate definitions expressed in quantitative indexes to delineate traditional societies, modern societies and high and low fertility and mortality, such that as of a given recent date (say, 1960) all societies qualified as traditional according to the objective quantitative criteria do, in fact, have high fertility and mortality; and all societies qualifying as modern do, in fact, have low fertility and mortality. The societies "in between" overlap, at each end, with demographic characteristics of traditional and modern societies. The definitions might be along the following lines: A society was modern, in 1960, if at least 50 per cent of the population lived in urban settlements of more than 20,000 persons, if more than 90 per cent of the female population at ages 6-13 was enrolled in school and fewer than 30 per cent of the labour force was engaged in agriculture, fishing and forestry. A society was traditional if less than 30 per cent of its populations lived in urban settlements of more than 20,000 persons, if fewer than 50 per cent of females aged 6-13 were enrolled in school and if more than 60 per cent of the labor force was engaged in agriculture, fishing or forestry. High fertility and mortality could be defined as a total fertility of over 5.0 and an expectation of life at birth for women of less than 60 years and low fertility and mortality defined as a total fertility of less than 4.0 and an expectation of life at birth for women of over 68 years. The set of modern countries with low fertility and mortality includes communist, socialist and capitalist countries; Protestant, Catholic, atheist and Shintoist countries; and countries of Asian as well as European culture. This exercise illustrates the power—and the weakness—of the concept of the transition as it stands today. Its power lies in the undeniable fact that with sufficient modernization fertility and mortality change in a predictable manner. As Livi-Bacci once remarked, families of eight children are not common in any population that lives primarily in urban apartment houses and enjoys the use of telephones, television sets and motor-cars; whereas in an earlier, largely agrarian, less technologically advanced point in the history of such a population, large families were not unusual.

30. The weakness of the concept is associated with the difficulty of defining a precise threshold (a check list of essential characteristics, or a combined score on some socio-economic scale) of modernization that will reliably identify a population in which fertility is ready to fall. Attempts have been made to modify the concept of a threshold to allow for cultural differences in different parts of the world by defining regional thresholds and to allow for the evolution of the cultural environment of the world as a whole by defining a moving threshold. These expedients may prove successful; they represent one of the current strategies for modifying the early versions of the transition. In 1870, only France and the United States had reduced fertility very far, but the country farthest along with industrialization was England. Essentially universal primary education had been achieved in Germany and Scandinavia by 1870, but fertility there remained on a high plateau. One cannot define measure of modernized and traditional, and high and low fertility and mortality for 1870 that would work as well as the definitions for 1960.

Pre-conditions for sustained decline in marital fertility

31. The diversity of circumstances in which marital fertility has declined, and the consequent difficulties of formulating a well-defined threshold, may originate in the existence of more than one broad pre-condition for a decline. Three general prerequisites of a major fall in marital fertility can be listed:

[9] Paul Demeny, "Early fertility decline in Austria-Hungary: lesson in demographic transition", *Daedelus*, vol. 97 (1968), pp. 502-522.

(1) Fertility must be within the calculus of conscious choice. Potential parents must consider it an acceptable mode of thought and form of behaviour to balance advantages and disadvantages before deciding to have another child—unlike, for example, most present-day Hutterites or Amish, who would consider such calculations immoral and consequently do not control marital fertility;

(2) Reduced fertility must be advantageous. Perceived social and economic circumstances must make reduced fertility seem an advantage to individual couples,

(3) Effective techniques of fertility reduction must be available. Procedures that will in fact prevent births must be known, and there must be sufficient communication between spouses and sufficient sustained will, in both, to employ them successfully.

32. Alternative explanations of the decline of fertility differ in the assumptions they make (implicitly or explicitly) about these prerequisites. Biological explanations ignore all three as irrelevant. A purely technological explanation (not much more tenable than the biological) would emphasize the invention and subsequent diffusion of effective techniques and implicitly treat the other pre-conditions as always present or unimportant.

33. Explanations of the transition by economists (such as Gary Becker, Richard Easterlin or Paul Schultz) accept a rational conscious choice as an axiom of human behaviour and look for the source of the change in fertility in pre-condition to a changed balance of the advantages and disadvantages of high fertility. The availability of effective techniques can be included in the economists' approach as an element affecting the cost of achieving reduced fertility. The authors of the transition said that modernization produces the first two pre-conditions and that the third (effective technique) was always latent.

34 An approach towards the reconciliation of the universality of the major decline in marital fertility in highly modernized societies with the variety of circumstances in which the decline occurs can be made in the following manner. If any society is to achieve the very high productivity that can be attained through modern science, engineering and industrial organization, it must acquire certain characteristics, for example, an agglomerated residential pattern (typically in cities) and a variety of customs and attitudes suited to industrial rather than agrarian life. Among the characteristics a society must acquire to achieve the conspicuous material gains from modernization are the three pre-conditions for a decline in marital fertility. For simplicity, one might say that in respect to the pre-conditions, highly modernized societies are essentially homogeneous

35. On the other hand, it is not true that all the pre-conditions are absent in all pre-modern societies. Instead, these societies differ widely in the prevalence of the prerequisites and in the degree of change that must occur before the pre-conditions are introduced—just as pre-modern societies differ in readiness to sei the opportunities for material gain inherent in the poss bility of modernizing In some pre-modern societies a three prerequisites for a decline in fertility exist ar fertility is reduced before extensive modernizatic occurs At the other extreme, all of the prerequisit are absent and deeply entrenched customs oppose the introduction In between are populations in which or or more, but not all, the pre-conditions are presen The Hutterites appear to be an example of a populatio in which the second prerequisite and possibly tl third exist, but a powerful religious dogma is barrier to the first, the unmarried couples of the mi nineteenth century surely were subject to the secon prerequisite and probably the first, but had highe than intended fertility because of inadequate mastery c an effective contraceptive technique

36 If the first prerequisite is present in one nationa population and virtually absent in another, the province by-province intercorrelations between marital fertilit and various socio-economic characteristics may be quit different in the two populations Unmeasured tradition and habits of mind may be the basis for differenti resistance to the establishment of the first pre-conditio and may be one reason for the strong relation (discusse earlier) between region and fertility Because of a diffe ent culture based on a different language and differer history, Basques with a certain number of years c schooling and a given occupation are different fror Catalonians with the same qualifications, German from Frenchmen and Southern Italians from Norther *Italians*

37 The strong regional patterns found in the declin of fertility can be interpreted, alternatively, on the basi of the presumed mechanism by which a new attitud towards childbearing or a new degree of skill in th control of conception is established A new attitude o skill does not appear simultaneously in all members o the population, but spreads from the pioneers who firs adopt is to the rest The mechanisms of the sprea must be to a large extent imitation, combined wit informal, person-to-person communication among clos friends and relatives. National, linguistic or other re gional boundary lines may delimit the groups whos day-to-day behaviour is ordinarily imitated and wit whom intimate communication occurs The boundarie may serve as fire-breaks that temporarily confine spread of controlled fertility. Probably the decline o fertility has a strongly regional pattern for both of thes reasons—both because regions with different culture are differentially resistant to the prerequisites of declin and because a region defined by a common language an culture is a natural unit within which diffusion occur more readily than it does across regional boundaries.

THE DEMOGRAPHIC TRANSITION IN LESS DEVELOPED COUN S

38. In the 1940s, looking cts lation growth in the large wo

of Asia, Africa, Latin America, the Caribbean, and the large island populations south-east of Asia) that had experienced little modernization, the authors of the transition forecast a period of very rapid expansion. Their interpretation of transitional experience where it had already occurred was that with modernization death rates had been more easily reduced than birth rates, that the decline of mortality therefore occurred first and that there was a period of rapid growth because of the gap between the time of the two declines. The implication of the demographic transition for the less developed part of the world at the end of the Second World War was that modernization (needed to alleviate extreme poverty) would inevitably cause the same early decline in the death rate, while birth rates remained high, and consequently a period of rapid growth was in prospect. The most urgent need in the realm of population policy for the less developed countries was to shorten the gap between the fall in the death rate and the fall in the birth rate.

39. One cannot help but be impressed with the validity of this forecast and the accuracy of this insight into coming population problems. Attempts to make quantitative forecasts, however, fell far short of subsequent events: the difference between birth rates and death rates was much greater than foreseen. In population after population, the decline in mortality was more rapid than it had ever been in the earlier experience of the pioneers in modernization. Scientific advances in medicine, and inventions and innovations in sanitation and public health occurring in the laboratories and research centres of the modernized world proved (largely by design) readily transferable to less developed areas. For a decade or more, the average duration of life has not infrequently risen one year with the passage of each calendar year, even when general social and economic progress has been moderate. The forecast of the transition was thus accurate in direction but inaccurate in detail, with respect to mortality. The error was in underestimating the pace of decline, and overstating the connexion with over-all modernization.

40. The forecast of the course of fertility was also qualitatively correct: the decline of fertility has lagged behind the decline of mortality. Indeed, a substantial decline in fertility has occurred in only a fraction of the areas that were pre-transitional at the end of the Second World War.

41. Looking at the history of the most highly modernized countries, the demographic transition correctly tells us that in all such countries fertility and mortality were much higher in the pre-modernized state; looking to the future of countries that in 1945 still had high fertility and mortality, it correctly predicted that mortality would decline before fertility, producing rapid growth. In neither instance does it specify, in terms that can be translated into quantitative measures, the circumstances in which the decline of fertility begins.

42. The success of the demographic transition, limited though it may be in interpreting the past and predicting the future, has made it an instrument in many debates about appropriate measures to reduce fertility in low-income countries with rapidly growing populations. It has been invoked in opposition to large investments in research on new contraceptive techniques and especially in opposition to the establishment of large national programmes to introduce birth control and programmes supported by technical assistance from the more developed countries. The argument against such measures is that the demographic transition shows them to be ineffectual; it is modernization that brings about a reduction in fertility through a modification of attitudes and a change in the balance of advantages and disadvantages from large families. A family planning programme operating many clinics and offering the latest in pills, injections and intra-uterine devices is useless without profound social and economic change.

43. Supporters of birth control programmes also invoke the transition by proposing that such programmes be planned as part of (not in place of) broad plans for social and economic development; by opposing policies of retarding the acceleration of population growth through the restriction of expenditures on public health, noting that mortality reduction is one of the factors causing a decline in fertility; and by supporting the development of new contraceptive technology on the grounds that if motivation is important, contraceptives should be developed that require less effort and less emotional cost.

44. The re-examination of the demographic transition gives no clear indication whether or not birth control programmes in countries at an early stage of modernization can be successful. It has been noted that rural, poorly educated populations have in the past reduced fertility by voluntary control, even when mortality was higher than it is now in less developed countries. In fact, the weakness of the idea of the transition is that it shows that a high degree of modernization is sufficient to cause a fall of fertility, but does not say what degree (if any) of modernization is necessary to produce a fall. Three broad conditions were proposed earlier as necessary: the acceptance of calculated choice as a valid element in marital fertility; the perception of advantages from reduced fertility; and knowledge and mastery of effective techniques of control. Apparently, modernization ultimately establishes these conditions; but, also, apparently, they can occur in less modernized communities. There is no convincing basis for asserting that a programme of indoctrination in the advantages in health and welfare from reduced fertility would inevitably be a failure in a rural, poorly educated population. Acceptance of contraception by national and community leaders would help make rational choice in fertility respectable.

45. European history suggests that educational efforts might be easier to design and implement effectively in some cultures than in others. The regional, or cultural, factor is evident in the declines in fertility that have begun since the Second World War in various

parts of the world, as well as in the earlier European experience. The first reduction of fertility in East Asia was in Japan; and other East Asian populations with reductions approaching (or exceeding) 50 per cent include those of Hong Kong, the Republic of Korea, West Malaysia and Singapore.

46. In re-examining the decline of fertility in western Europe, it was observed that there must have been two transitional periods: a Malthusian transition in which later marriage and fairly common spinsterhood replaced early and universal marriage, and a Neomalthusian transition in which marital fertility fell. One transition is the fall in I_m, the other a fall in I_g. In conclusion, it may be suggested that there is a tendency for both transitions to occur during the modernization of a traditional society if it is at first characterized both by high marital fertility and by very early and universal marriage (mean age of marriage below 20 and 1 or 2 per cent remaining single). Each transition then makes an important contribution to the over-all decline in fertility.

47. It has been concluded that in no highly modernized society are married couples subject to "natural fertility"; it may also be concluded that in no highly modernized society is the mean age at marriage likely to be below 20 years, or the proportion remaining single less than 3 per cent. Apparently universal and very early marriage occur only when marriages are arranged by the parents of the bride and groom, and such powerful roles of the family are among the traditional forms of behaviour that do not survive intensive modernization. Countries that have undergone extensive social and economic change have had large reductions in I_m because of the virtual disappearance of extremely early marriage. The provinces in Russia with values of I_m above 0.75 in 1897 had all experienced large reductions by 1926 and further decreases by 1959.

48. In the Far Eastern populations in which fertility has fallen sharply, there has been an increase in the age at marriage as well as a decline in marital fertility. In Japan from 1920 to 1950, and in Singapore from 1957 to 1966 (with reductions in I_f of about 25 per cent and 35 per cent, respectively), the reduction in I_m was about as great as the reduction in I_g. The reduction of I_m has also been important in Hong Kong and elsewhere. If less developed countries with high birth rates also have very high values of I_m, examples indicate that later marriage can occur and that it has a large fertility-reducing effect. It is a suitable, but relatively neglected instrument of public policy in the countries in question.

TRANSITION DÉMOGRAPHIQUE ET DEVENIR DU PATRIMOINE GÉNÉTIQUE

Albert Jacquard *

1. Pour le démographe une population est un ensemble d'individus; mais une telle définition s'arrête à l'aspect extérieur, provisoire, changeant, de l'objet étudié; d'une génération à l'autre les individus disparaissent, sont remplacés par d'autres avec lesquels ils n'ont que des relations partielles; toute comparaison est arbitraire. Si l'on cherche à saisir une réalité plus permanente, plus profonde, il faut considérer, au-delà des individus, les gènes dont ils sont porteurs, qu'ils transmettent, identiques, à leurs enfants, et dont l'ensemble constitue le patrimoine biologique de la population.

2. Certes, l'histoire des personnes ne peut nous être indifférente, mais dans le très long terme, seule l'histoire des gènes est significative car c'est elle qui, en définitive, conditionne celle des individus; ces gènes constituent l'essence même du groupe, sa "nécessité" alors que les personnes n'en sont que l'expression provisoire, fruit du hasard.

3. Pour illustrer cette opposition de façon un peu simpliste, imaginons deux populations *A* et *B* comprenant chacune 100 personnes; dans la population *A*, 10 personnes possèdent chacune deux exemplaires d'un certain gène récessif *t* provoquant, lorsqu'il est doublement présent chez un individu, une grave maladie; les 90 autres personnes possèdent deux "bons" gènes *T*. Dans la population *B* au contraire, personne n'est malade car personne ne possède deux exemplaires du gène *t*; cependant 30 individus possèdent un "mauvais" gène *t* et un "bon" gène *T*, ce qui ne les empêche pas d'être bien portants puisque *t* est récessif. Apparemment, seule la population *A* est atteinte par cette maladie, seule elle requiert des soins, et pourtant aux yeux du généticien la population *B* est plus sévèrement touchée encore car, sur 200 gènes, 30, soit 15 p. 100, représentent le gène *t*, alors que cette fréquence n'est que de 10 p. 100 dans la population *A*. Si l'on considère l'avenir c'est le point de vue du généticien qui est réaliste : le risque pour un enfant à naître d'avoir cette maladie est plus élevé dans *B* que dans *A*, car c'est dans *B* que les hasards de rencontre des gènes rendent le plus probable l'attribution de deux gènes *t* à un enfant.

4. La véritable histoire biologique d'un groupe humain est ainsi l'histoire de la transformation de son patrimoine génétique. Cette transformation peut résulter de l'effet de la sélection (si les porteurs de tel gène résistent mieux que les autres aux agressions du milieu, ou ont une plus grande fécondité, ce gène se répandra peu à peu dans la population), du choix du conjoint (qui peut favoriser ou défavoriser, selon l'éthique adoptée, les unions consanguines ou les unions homogames), des migrations (l'introduction de quelques immigrants prolifiques peut bouleverser les fréquences des divers gènes), des mutations (qui apportent, mais très rarement, des gènes nouveaux), ou tout simplement du hasard.

5. Ce dernier effet, moins évident, correspond au mécanisme même de la transmission des gènes : lors de la conception, le père et la mère fournissent chacun une moitié de leur patrimoine génétique, le choix des gènes transmis étant réalisé au hasard sans action possible de l'intéressé. Cette intervention du hasard est sans doute le caractère essentiel de la reproduction sexuée, elle entraîne, à chaque génération, l'insertion d'un facteur aléatoire, d'une indétermination; si nous connaissons parfaitement les gènes d'une homme et d'une femme pour un certain caractère, disons (AB) et (CD), nous ne connaissons qu'en probabilité les divers génotypes possibles de leur fils (AC), (AD), (BC) ou (BD); à la connaissance totale a succédé l'ignorance partielle.

6. Evident au niveau de l'individu, ce rôle du hasard se retrouve au niveau de la population, plus ou moins amoindri selon que l'effectif est plus ou moins élevé.

7. Pour étudier les transformations du patrimoine génétique, un ensemble de concepts, de méthodes et de techniques a depuis le début de ce siècle été progressivement élaboré et mis au point, permettant l'essor d'une nouvelle branche de la science, devenue peu à peu plus autonome, la génétique des populations.

8. Certains développements de cette génétique des populations permettent de prévoir les conséquences pour le patrimoine héréditaire de tel ou tel changement du comportement, dans la mesure où ces changements concernent la transmission des gènes entre les générations. Or l'humanité vient, en l'espace de deux siècles, de vivre deux "révolutions démographiques", qui toutes deux influencent cette transmission; le but de la présente étude est de montrer comment les concepts et les méthodes du démographe et ceux du généticien peuvent, et doivent, se compléter, s'associer pour aboutir à une meilleure connaissance des forces qui sont en œuvre, à une meilleure compréhension des processus dans lesquels elles interviennent.

9. En fait, ces processus sont encore bien mal connus; l'acquisition de nouvelles connaissances amène la

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remise en cause des explications antérieures; diverses écoles s'affrontent en de vives discussions; avant tout, il paraît nécessaire de faire le point des connaissances en génétique des populations humaines et des théories actuelles sur la dynamique de l'évolution biologique de l'homme.

La génétique des populations état des connaissances et problèmes en suspens

10. Dès la redécouverte, en 1900, des lois de Mendel, de nombreux laboratoires ont rapidement élargi le domaine de la génétique physiologique et accumulé les résultats qui, en un demi-siècle, ont permis de comprendre le merveilleux mécanisme grâce auquel se reproduisent les cellules ou les individus. Mais cet aspect microscopique, individuel, maintenant bien connu, doit être complété par un aspect macroscopique, collectif, qu'étudie la génétique des populations. Les premiers développements de celle-ci ont été l'œuvre d'une poignée de mathématiciens dont les plus importants furent Sewall Wright, R. A Fisher, J. B. S Haldane et G. Malécot. Sous leur impulsion cette science est devenue autant un domaine particulier des mathématiques appliquées qu'une branche de la biologie.

Les mathématiques de la génétique

11. Le premier succès important de l'analyse de la transmission du patrimoine génétique collectif a été la célèbre "Loi de Hardy-Weinberg"; elle montre que la structure génotypique d'une population est liée par une relation simple à sa structure génique; autrement dit, la connaissance des fréquences des gènes permet d'estimer celles des génotypes; ainsi pour un locus tel que celui [illegible] ABO [illegible] de connaître les fré- [illegible]

BO, OO.

12. Ce résultat ne peut s'obtenir qu'en accumulant les hypothèses simplificatrices, c'est-à-dire en bâtissant un "modèle" qui ne cherche pas à représenter la réalité, mais qui se veut assez proche d'elle pour pouvoir servir utilement de référence, à quoi comparer les observations. Les travaux ultérieurs ont consisté surtout à nuancer ce modèle, à multiplier les paramètres pris en considération, à tenir compte de leurs interactions, afin d'accroître sa capacité de description et de prévision.

13. Dès 1918, R. Fisher établissait les équations [illegible]

l'importance du hasard dans la transformation du patrimoine génétique.

14. Non seulement les mathématiques se révélaient être l'outil indispensable à la solution de certains problèmes de génétique des populations, mais ceux-ci s'avéraient souvent être d'une complexité telle, posaient également des questions si nouvelles, que des techniques mathématiques spécifiques devaient être créées: c'est souvent à propos de problèmes de génétique que Fisher a imaginé les méthodes statistiques qui l'ont rendu célèbre.

15. Un changement profond a été apporté à partir de 1948 par Malécot, introduisant le raisonnement probabiliste, il a permis de rendre plus rigoureux de nombreux résultats, d'en généraliser la portée, et surtout a amené la remise en cause de certaines idées prévalentes, tel est le cas pour les travaux de Kimura, qui a introduit le concept de gène neutre et a utilisé systématiquement les équations de Kolmogorov permettant d'étudier l'évolution des lois de probabilité des fréquences des gènes

16 Depuis une dizaine d'années le nombre de mathématiciens qui œuvrent dans le domaine de la génétique s'est rapidement accru; de très nombreux *résultats théoriques ont été obtenus; mais on peut craindre* que la communication entre expérimentateurs ou observateurs d'une part, théoriciens de l'autre n'en ait pas été améliorée Un effort de mise en ordre, de clarification, de précision des concepts et, de la part des mathématiciens, de simplification du langage, est nécessaire si l'on veut maintenir un minimum de cohérence

17 Un tel souhait ne signifie nullement qu'il faille ralentir l'effort actuel des équipes de génétique mathématique; en fait de très nombreux problèmes importants restent encore mal résolus (ou plutôt n'ont encore reçu que des solutions partielles) Citons par exemple. la mesure de l'information concernant un individu apportée simultanément par plusieurs apparentés de génotypes connus, l'effet sur la structure génétique de certains comportements matrimoniaux ou migratoires, l'effet de la consanguinité sur certains caractères à seuil, la détection et la mesure d'éventuels effets sélectifs, l'utilisation des données rassemblées sur les structures génétiques en vue de reconstituer l'histoire de la formation des divers groupes humains, etc.

Simulation des processus génétiques

18. La généralisation de l'usage des *computers* a permis d'apporter des éléments de réponse à certains problèmes trop complexes pour pouvoir faire l'objet d'un *traitement mathématique aboutissant à des solutions* explicites. La technique de "simulation Monte Carlo", notamment, a été largement utilisée et s'est révélée fort efficace: elle utilise comme "matériau" le hasard, intervenant sous forme de tirages aléatoires de nombres; elle est donc particulièrement adaptée à l'étude des processus génétiques dont le propre est justement de faire intervenir le hasard. On peut ainsi reconstituer l'évolution d'une population ou d'une structure *génique en raccourcissant la durée du phénomène* observé, les générations successives ne sont plus en effet que des ensembles de signaux magnétiques qui se renouvellent, selon des règles préétablies, en quel[illegible]es centièmes de seconde et non plus 0 ou 30

19. Très utiles pour vérifier la validité d'un résultat théorique, ou sa robustesse lorsque certaines des hypothèses qui ont permis de l'établir sont levées, ces simulations ne sont pas sans danger : d'une part, elles peuvent constituer une solution de paresse et détourner de la recherche directe, souvent complexe en apparence mais qui aurait pu aboutir au prix d'un certain effort de conceptualisation; d'autre part, leurs résultats ne sont jamais tout à fait sûrs, car ils sont à la merci d'"hypothèses implicites" parfois difficiles à déceler : une simulation montre, mais ne démontre pas.

20. Des résultats très intéressants n'en ont pas moins été obtenus dans l'analyse des effets de certains comportements matrimoniaux, de la rapidité de la dérive génétique, de l'effet à long terme des migrations, ou de la différenciation de petites populations isolées. Des recherches sont en cours pour analyser grâce à des simulations les généalogies étendues recueillies dans certaines populations.

Conseil génétique

21. Le plus souvent le conseil génétique, c'est-à-dire l'information des couples pour lesquels existe, ou peut exister, un risque de procréer un enfant porteur d'une tare génétique, ne peut se baser sur la seule analyse des pedigrees des intéressés; il doit tenir compte des données de la génétique des populations permettant d'estimer un risque *a priori*.

22. L'estimation de la fréquence dans une population d'un gène détériorant, la détermination de la structure génotypique des parents ou de l'enfant à naître (c'est-à-dire le calcul des probabilités des divers génotypes qu'ils peuvent posséder en un certain locus), l'évaluation des risques liés à la consanguinité, ne peuvent être menées à bien sans le recours aux concepts et aux techniques de la génétique des populations.

23. Dans un délai sans doute bref, l'information manipulée pourra être beaucoup plus riche grâce à la localisation sur les divers chromosomes humains de nombreux gènes nouveaux; la technique de l'hybridisation cellulaire (c'est-à-dire la culture de cellules issues du croisement des cellules somatiques d'hommes et, par exemple, de souris) permet en effet de déterminer sur quel chromosome est situé le locus responsable de tel "marqueur". La carte chromosomique de l'homme (si pauvre il y a quelques années en raison de l'impossibilité de réaliser les croisements expérimentaux qui ont permis de situer quelque 1 000 gènes chez la drosophile) se complète rapidement; avant quelques années, il est probable qu'une centaine de marqueurs seront connus avec précision. Cette connaissance nouvelle de la structure des chromosomes humains pourra étendre largement le champ du diagnostic prénatal : en effet, dans la mesure où les gènes correspondant à ces marqueurs pourront être déterminés à partir de cellules amniotiques, l'on sera en mesure de calculer la probabilité de présence, chez le fœtus, de certains allèles détériorants situés en des locus en étroit linkage avec ces marqueurs. Plus nombreux seront les marqueurs, plus grande sera la chance qu'une maladie génétique donnée soit liée à l'un d'entre eux.

24. La "liaison" entre une maladie et un gène marqueur peut d'ailleurs correspondre non pas à un linkage entre locus, mais simplement à une corrélation statistique. Après de nombreuses recherches décevantes, le système d'incompatibilité tissulaire HL-A s'est révélé récemment comme très riche d'informations à ce sujet : la probabilité de certaines maladies rares est considérablement accrue pour les personnes dotées de tel ou tel gène HL-A; on imagine les possibilités que cette constatation apporte pour les individus soumis au risque de ces maladies.

Etude des isolats

25. Les "isolats", populations de faible effectif et n'ayant que peu d'échanges avec les populations voisines, ont souvent été considérées comme des "laboratoires" dans lesquels les effets des divers facteurs qui modifient la structure génétique (sélection, migration, hasard) pourraient être mesurés. Les études en ce domaine ont parfois été décevantes, faute d'une connaissance assez précise du régime de mariage et des flux migratoires. Cependant des cartes géniques du monde ont pu être progressivement établies, indiquant pour les principaux marqueurs (essentiellement les systèmes sanguins) les zones de prépondérance des divers allèles. A partir de ces données, et au prix de manipulations mathématiques souvent complexes (définition de "distances génétiques", projection optimale d'univers multidimensionnels, analyse des correspondances, *cluster analysis*, . . .), des tentatives de reconstitution d'arbres phylogénétiques, précisant les origines des divers groupes humains, ont abouti à des résultats fort intéressants.

26. Toute l'anthropologie s'est trouvée ainsi, depuis une dizaine d'années, renouvelée dans ses bases mêmes; son objet n'est plus exclusivement l'individu tel qu'il peut être défini par des mesures anthropométriques, mais tel qu'il peut être caractérisé par les divers processus biochimiques dont le déterminisme génétique a pu être précisé.

27. Récemment, une nouvelle catégorie de données a permis d'enrichir encore cette "nouvelle anthropologie"; elle correspond aux "déséquilibres de linkage" qui peuvent être calculés pour les associations de gènes situés en des locus voisins. Là encore le système d'histo-comptabilité HL-A s'est révélé extrêmement riche d'informations; il est en effet sous la dépendance de deux locus très voisins (le taux de recombinaison entre eux est inférieur à 1 p. 100), occupés par de nombreux allèles (au moins 15 pour l'un et 20 pour l'autre). De nombreuses observations réalisées dans plus de 50 populations réparties sur toute la terre, par de multiples équipes dont les travaux ont été coordonnés et rendus comparables, ont permis de dresser la carte non seulement des fréquences des gènes, mais des déséquilibres de linkage. Or ceux-ci sont la trace de la fusion de populations de structures géniques inégales; on peut ainsi retracer les grandes migrations qui ont abouti aux peuplements actuels.

Conclusion

28. Ce rapide tour d'horizon montre à la fois la diversité et la difficulté des problèmes dans lesquels peut intervenir la génétique des populations. Il est important d'insister sur un point : toutes ces recherches ne peuvent être menées à bien que par des équipes véritablement multidisciplinaires; tout résultat intéressant nécessite la collaboration de l'ethnologue, du biologiste, du médecin, du mathématicien. Peu de pays ont su, jusqu'à présent, mettre en place les structures permettant la constitution de telles équipes; sans doute l'Année mondiale de la population pourrait-elle créer les conditions d'un certain progrès en ce domaine.

LA DYNAMIQUE DE L'ÉVOLUTION

Le néo-Darwinisme classique

29. En réaction contre la théorie de Lamarck, qui admettait l'"hérédité des caractères acquis", explication toute naturelle et de bon sens mais malheureusement non conforme à la réalité, Darwin proposa une explication de l'évolution basée sur les "variations spontanées" et sur la "lutte pour la vie" réalisant une "sélection naturelle" des plus aptes

30. La découverte de la véritable nature du support de l'hérédité permit de répondre aux questions que le Darwinisme laissait en suspens et d'élaborer une théorie, le néo-Darwinisme, considérée jusqu'à il y a quelques années comme une explication satisfaisante de l'évolution.

31. La source des "variations spontanées", dont Darwin postulait l'existence, est constituée par les mutations qui, avec une fréquence faible, transforment, au hasard, un gène en un autre gène ayant parfois une action différente. Sous l'effet d'un rayonnement, d'un agent chimique, ou tout simplement par suite d'une erreur de copie, le segment de chromosome contenant l'information permettant la synthèse d'une certaine protéine, par exemple la chaîne β de l'hémoglobine, subit le changement de l'une des bases chimiques qui le constitue; cela peut suffire pour que la protéine correspondante ait des propriétés nouvelles, que, par exemple, l'hémoglobine normale A soit remplacée par une hémoglobine déficiente S.

32. Les individus possédant ce gène nouveau, soit à simple dose, s'il est dominant, soit à double dose, s'il est récessif, manifestent le caractère correspondant, lorsque ce caractère est favorable, permettant de mieux résister aux maladies ou améliorant la fécondité, ces individus auront plus de descendants, en moyenne, que les autres et le gène se répandra dans la population; lorsqu'il est défavorable, il sera peu à peu éliminé. Des cas plus complexes peuvent se présenter; ainsi pour l'hémoglobine S, défavorable à l'état homozygote "SS", car elle entraîne une anémie souvent mortelle, mais favorable à l'état hétérozygote "AS", dans les régions impaludées, par la protection qu'elle apporte contre l malaria [1].

33. De nombreux modèles ont été développés par l généticiens de population; tenant compte d'un gran nombre de paramètres sur la nature et l'intensité de l sélection, la fréquence des mutations, les migrations, l comportement matrimonial, l'effectif des groupes, i permettent de définir les équilibres vers lesquels tend l structure génétique. Le trait le plus remarquable de ce équilibres est que, en général, ils correspondent à u optimum de la valeur sélective du groupe; il y "adaptation" de la population à son milieu Ainsi s trouve confirmée, développée, la théorie de Darwin

34 Construits surtout pour expliquer l'évolution long terme, la lente différenciation des espèces, ces mo dèles peuvent être appliqués à la transformation pro gressive d'une même espèce, ou d'une même populatio notamment une population humaine; ils accréditer l'idée que les divers groupes humains se différencier peu à peu, aboutissant à des "races" distinctes, sou l'effet de facteurs sélectifs qui adaptent chaque group à son milieu.

35 Cependant la logique même du néo-Darwinism *si on la prolonge et si on la confronte à des résulta* d'observations récents, aboutit à des paradoxe insolubles

La remise en cause du néo-Darwinisme, gènes neutres et hasard

Le fardeau génétique

36 L'analyse électrophorétique de nombreuses pro téines a récemment montré [2] qu'une grande proportio de celles-ci (de l'ordre de 30 p 100), sont "polymor phiques", c'est-à-dire ont des caractéristiques variable d'un individu à l'autre, autrement dit le stock géné tique, loin d'être uniforme, comporte, pour la plupa des locus, de nombreux allèles Le maintien de c polymorphisme ne peut guère être expliqué par l'actio de la sélection qui entraînerait un "fardeau génétique considérable.

37. En effet, pour chaque locus, l'existence d'un sélection signifie que certains individus ont une fécondit ou une viabilité plus faible que certains autres, la capa cité moyenne de la population à résister aux agression de son milieu et à se reproduire est donc inférieure celle des individus les mieux dotés, sa "valeur sélective n'est pas à son optimum; la conservation de plusieur allèles signifie que des enfants meurent à cause des gène qu'ils possèdent, que des adultes sont stériles Ainsi, le populations chez qui le gène de l'hémoglobine S s maintient à une fréquence de 10 p. 100, "paient" ce équilibre de la mort de 1 p. 100 des enfants (ceux qu sont conçus homozygotes SS) et de 12 p. 100 de

[1] A. Allison, "Protection afforded by sickle-cell trait again

p 681-685.

adultes (les homozygotes AA non protégés contre la malaria).

38. Si de nombreux locus étaient sous la dépendance d'un tel mécanisme, le fardeau génétique serait invraisemblablement élevé, entraînant inéluctablement la disparition du groupe. Certes, des modèles plus complexes, tenant compte de l'interaction des divers locus, d'effets sélectifs à seuil, du linkage entre locus situés sur une même portion de chromosome, etc., permettent d'obtenir une estimation plus faible du fardeau correspondant à un nombre donné de polymorphismes. Cependant, il semble exclu que plus de quelques milliers de locus puissent être soumis à un tel mécanisme.

39. Or, le nombre total de gènes est, chez l'homme, de l'ordre de un million à deux millions; le nombre de locus polymorphiques dépasse donc plusieurs centaines de milliers.

Lenteur et inefficacité de la sélection

40. La transmission du patrimoine génétique, nous l'avons vu, fait intervenir le hasard. Au niveau des populations le rôle joué par ce hasard est d'autant plus important que l'effectif est plus petit. Son effet, bien connu depuis les analyses de Wright [3], est la "dérive génétique", c'est-à-dire l'élimination de certain allèle, l'homogénéisation progressive du patrimoine génétique. Mais ce n'est que récemment, grâce aux travaux de Kimura [4], qu'a été mise en évidence l'efficacité du hasard dans son opposition aux forces sélectives.

41. Sans entrer dans le détail de calculs complexes basés sur les équations Forward et Backward de Kolmogorov, indiquons certains résultats essentiels. Imaginons qu'un gène apparu par mutation apporte un avantage sélectif s à ceux qui le possèdent à simple dose (leur valeur sélective est égale à $1 + s$, si celle des autres individus vaut 1, est de $2s$ à ceux qui le possèdent à double dose. L'avantage de la population, son "adaptation", voudrait que ce gène se répande et supplante tous les autres; un tel événement, la "fixation" du gène avantagé, a une probabilité :

$$P = \frac{1-e^{-2s}}{1-e^{-4Ns}}$$

où N est l'effectif du groupe.

42. Cette formule montre tout d'abord que la plupart des mutations favorables sont, malgré cet avantage, éliminées : si $s = 0{,}02$ et N grand, $P \approx 2s$, autrement dit sur 100 mutations apportant un avantage de 2 p. 100, 96 sont éliminées, 4 seulement finissent par s'imposer.

43. Bien plus, si N est petit, des mutations défavorables peuvent fort bien se répandre et remplacer tous les autres gènes : avec, par exemple : $N = 20$ et $s = -0{,}02$, on obtient: $P = 1$ p. 100 (tandis que pour un gène favorable tel que $s = +0{,}02$, la probabilité de fixation est, avec le même effectif de 20 individus, $P = 4{,}9$ p. 100).

44. Ce résultat, qui peut sembler paradoxal, montre comment l'action du hasard, d'autant plus puissante que l'effectif de la population est plus petit, peut s'opposer à celle des causes systématiques, et même parfois l'emporter, provoquant une évolution contraire à l'adaptation.

45. Même dans le cas favorable où un gène avantageux finit par éliminer les autres, il faut remarquer que le processus est extrêmement lent; la durée en est si longue que les conditions favorisant un gène risquent fort d'avoir changé avant que ce gène ne soit fixé. Ainsi, le nombre de générations nécessaire pour que la fréquence d'un gène présentant un avantage sélectif de 2 p. 100, passe de 10 p. 100 à 90 p. 100 est de l'ordre de : 500 générations s'il est dominant ou récessif; 220 générations s'il est codominant; autrement dit une dizaine de millénaires suffisent à peine pour assurer la diffusion d'un gène favorable. De façon générale, Kimura a calculé que le nombre de remplacements d'un allèle par un allèle plus favorable est, en moyenne, de l'ordre de 0,006 par génération dans une population de 10 000 habitants, soit une substitution de gène tous les 4 ou 5 000 ans.

L'évolution "non darwinienne"

46. On peut alors imaginer que, pour un grand nombre de locus, le polymorphisme dans chaque population, comme les variations de structures géniques entre populations, ne sont nullement la résultante d'actions sélectives adaptant chaque groupe à son milieu, mais simplement l'effet du hasard.

47. Nous avons vu que des gènes neutres (ou même, à un moindre degré, des gènes défavorables) ont une chance non nulle de se fixer, c'est-à-dire d'éliminer tous les autres gènes, dans une population de faible effectif. Si plusieurs gènes neutres apparaissent par mutation dans diverses populations, l'un se fixera dans une population, un autre dans une autre population, sans que cet aboutissement ait d'autre cause que l'accumulation des hasards des "loteries mendéliennes" par lesquelles les générations se perpétuent.

48. Le hasard, facteur d'uniformisation, d'homogénéisation, dans une population fermée, devient ainsi un facteur de diversification des groupes isolés les uns des autres au sein d'une même population.

49. Si cet isolement n'est pas total, si certains échanges génétiques se produisent, un certain polymorphisme s'instaure; tel gène "fixé" dans un groupe est réinjecté, grâce aux migrations, dans un autre où il est en cours d'élimination.

50. Dans un tel processus, le paramètre essentiel est le niveau des échanges entre groupes, c'est-à-dire l'ensemble des taux de migration. Dans les populations humaines, il est probable que depuis fort longtemps ces taux ont constamment varié, au gré des accords ou des antagonismes entre les groupes; aucun régime station-

[3] S. Wright, "Evolution in mendelian populations", *Genetics*, vol. 16 (1931), p. 97.

[4] M. Kimura et O. Ohta, *Theoretical Aspects of Population Genetics*, Princeton, New Jersey, Princeton University Press, 1971.

naire n'a pu véritablement s'instaurer assez longtemps pour qu'une situation d'équilibre soit approchée.

51. Les ensembles humains que nous pouvons individualiser actuellement se sont peu à peu constitués au hasard de "fissions" et de "fusions" :

(*a*) Les premières segmentent une population en groupes plus ou moins endogames, isolés génétiquement, ou même géographiquement, les uns des autres, subissant progressivement des évolutions qui les diversifient; *il s'agit par exemple de la révolte d'un petit* groupe qui fait sécession et va s'établir au loin; un "effet de fondateur" peut, dès l'origine, attribuer au nouveau groupe une structure génétique assez différente de celle de la population dont il se sépare;

(*b*) Les secondes réunissent au contraire en un seul groupe des clans d'origines diverses, dont les histoires génétiques ont été différentes, et qui, par un processus de mélange, plus ou moins rapide selon les règles d'échange de conjoints, mettent en commun des patrimoines génétiques hétérogènes.

52. Une telle analyse ne nie certes pas l'action qu'ont pu exercer les diverses forces sélectives, mais leur accorde une bien moindre part que certaines théories classiques : une population ne peut supporter des actions sélectives s'exerçant simultanément sur de très nombreux locus : en une période donnée, un petit nombre de ceux-ci, quelques centaines ou, au plus, quelques milliers, sont soumis à une sélection qui élimine peu à peu les "mauvais" gènes au profit des "bons"; pour tous les autres locus les divers allèles sont *"neutres"*, l'évolution de la structure génique n'est que le résultat du hasard.

53. On imagine facilement quelles remises en cause une telle optique entraîne : pour la plupart des caractères l'état actuel du patrimoine génétique ne correspond nullement à une certaine "adaptation", mais à une évolution fortuite, jamais achevée.

54 Selon que, dans les faits, la structure génétique des populations humaines est sous la dépendance plutôt de la sélection ou plutôt de la dérive au hasard, les effets sur cette structure de changements aussi profonds que ceux entraînés par les deux révolutions démographiques seront tout différents; conséquence plus importante encore, les mesures que certains pourraient tenter de définir et d'imposer pour améliorer le patrimoine génétique sont de natures opposées. Ce sont ces effets et ces mesures que nous allons chercher à préciser.

Lutte contre la mort et patrimoine génétique

55 Depuis deux siècles, les découvertes médicales ont apporté des progrès décisifs dans la lutte contre la maladie et contre la mort Il suffit pour mesurer la portée de cette "révolution démographique" de suivre l'évolution de l'espérance de vie à la naissance et à 15 ans dans les pays européens :

Espérance de vie

	Europe occidentale		France			
	XVII^e^ siècle	XVIII^e^ siècle	XIX^e^ siècle	1900	1940	1960
Hommes						
A la naissance	28,1	36,1	39,1	43,4	56,5	67,0
A 15 ans	30,2	39,5	—	44,7	48,2	54,7
Femmes						
A la naissance	33,7	38,2	40,6	47,0	62,5	73,6
A 15 ans	36,2	39,9	—	47,1	53,5	60,5

56. Les progrès ont surtout été considérables pour la période d'enfance et d'adolescence comme le montre l'évolution du taux de survie à 15 ans :

Nombre de survivants à 15 ans pour 1 000 naissances

	Europe occidentale		France			
	XVII^e^ siècle	XVIII^e^ siècle	XIX^e^ siècle	[illegible]	[illegible]	[illegible]
Hommes	628	664	684	[illegible]	[illegible]	[illegible]
Femmes			[illegible]	[illegible]	[illegible]	[illegible]

57. La modification du régime "naturel" a ainsi concerné essentiellement la période de la vie qui a le plus d'importance pour la transmission du patrimoine génétique [illegible] par l'[illegible] celle [illegible]

procréateur, enfants que l'on désigne par "enfants génétiquement utiles"[5].

58. A fécondité constante le recul de la mortalité pendant l'enfance et l'adolescence a entraîné une augmentation importante du nombre de ces enfants utiles. Mais cet accroissement quantitatif a-t-il été accompagné d'une perte qualitative ?

59. Le caractère "dysgénique" des progrès médicaux a été souvent dénoncé. Chaque fois qu'un enfant atteint d'une tare congénitale est guéri et mis dans des conditions où il peut mener une vie normale et procréer, les gènes dont il est porteur sont transmis à la génération suivante et se répandent dans la population au lieu d'être éliminés. Chaque conquête médicale, favorable à l'individu présent, porte en elle-même sa contrepartie, entraînant une détérioration génétique que supporteront les générations à venir.

60. Ce raisonnement semble justifié par certaines observations comme celles concernant le diabète dont la fréquence s'est accrue de façon sensible dans les pays développés; elle y atteint actuellement 3 à 4 p. 100 dans le groupe des personnes âgées. Cet accroissement peut être lié à l'utilisation de l'insuline qui permet aux diabétiques de mener une vie normale; mais il semble bien qu'en fait il soit surtout la conséquence de l'amélioration du niveau de vie : le diabète est une maladie à "seuil" et de faible pénétrance; de nombreuses personnes peuvent posséder les gènes responsables sans en éprouver les effets tant que leur régime ne comporte pas un excès de sucre[6].

61. De toute façon, même si la guérison d'une maladie génétique est en soi dysgénique, cet effet ne peut se manifester que très lentement. Pour mesurer le rythme de la transformation, considérons le cas de la maladie génétique de loin la plus répandue, la mucoviscidose, due à un gène récessif m dont la fréquence en Europe est de l'ordre de 2 p. 100. Les homozygotes mm étaient dans le passé très peu viables, leur "valeur sélective" était pratiquement nulle. Le fait que ce gène soit resté aussi fréquent fait admettre que les hétérozygotes possèdent un certain avantage (sans doute sous la forme d'une protection contre d'autres maladies); en supposant que la structure génique actuelle soit en équilibre, les valeurs sélectives des trois génotypes sont de l'ordre de : *mm* : O; M*m* : 1,02; MM : 1.

62. Supposons que les progrès de la médecine permettent de guérir complètement les enfants atteints de mucoviscidose, que leur fécondité s'aligne sur celle des autres homozygotes; les valeurs sélectives deviendraient respectivement : 1 — 1,02 — 1. On peut montrer qu'alors la fréquence p du gène subirait à chaque génération un accroissement Δp tel que : $\Delta p = 0{,}02\, p$. Cette fréquence passerait ainsi à 2,04 p. 100 à la première génération suivant ce progrès médical 2,08 p. 100 à la seconde . . ., il faudrait attendre plus de 30 générations, soit près d'un millénaire, pour qu'elle ait doublé; la proportion des individus atteints serait alors de 16/10 000 au lieu de Δ 10 000 actuellement, soit, à l'échelle de la France, 80 000 personnes au lieu de 20 000.

63. Encore ne s'agirait-il plus alors d'une "tare" puisque tous les homozygotes seraient, par hypothèse, en condition physique normale; le seul inconvénient du gène serait le coût des soins nécessités par quelques dizaines de milliers de personnes; ce coût pourrait d'ailleurs être considéré comme une contrepartie bien partielle, facilement justifiée, de l'avantage non négligeable dont bénéficieraient quatre millions d'hétérozygotes.

64. Il est difficile de considérer, dans un tel cas, que la médecine aurait eu un effet "dysgénique".

65. Il en est de même chaque fois que l'équilibre génétique peut être attribué à une viabilité meilleure des hétérozygotes. Nous avons évoqué précédemment le cas de l'hémoglobine S qui entraîne une grave anémie, l'anémie "falciforme", chez les homozygotes SS, mais protège les hétérozygotes AS contre le paludisme. Selon que le progrès permet de guérir l'anémie ou d'éradiquer le paludisme, ou les deux, l'évolution est toute différente; dans le premier cas la fréquence du gène S tendrait à s'accroître et à s'approcher de 50 p. 100; dans le second cas ce gène disparaîtrait; dans le troisième il deviendrait un gène neutre soumis aux seules fluctuations de la dérive.

66. Même dans une vue à long terme, les raisonnements qui tendent à donner mauvaise conscience à ceux qui guérissent, au nom des intérêts de la société future, sont, pour une bonne part, dépourvus d'arguments sérieux; en tout état de cause, même si un danger existe, il n'a en aucune façon un caractère d'urgence; enfin et surtout ces développements sont basés sur une distinction entre "bons" et "mauvais" gènes qui, sauf cas particuliers, est beaucoup trop simpliste; la complexité du monde vivant se laisse difficilement ramener à des catégories aussi tranchées.

Limitation des naissances et évolution génétique

67. Les victoires obtenues dans la lutte contre la mort, et singulièrement la mort des enfants, ont entraîné une première révolution démographique qui en impliquait une seconde constituée par la lutte, non sans doute contre la vie elle-même, mais contre l'apparition de la vie. Après une période transitoire, il faut bien qu'un nouvel équilibre soit établi; si l'on ne veut pas abandonner les positions conquises dans la lutte contre la mort, il faut faire face dans l'autre direction et lutter contre l'excès de naissances.

68. Cette lutte est de plus en plus efficace, la planification des naissances joue un rôle croissant dans de nombreux pays. Au-delà de son effet évident, recherché, sur l'effectif d'une population, cette attitude a des conséquences moins apparentes, mais sans doute plus impor-

[5] A. Jacquard, *The Genetic Structure of Population*, New York, Springer-Verlag, 1973.
[6] L. Cavalli-Sporza et W. Bodmer, *The Genetics of Human Populations*, San Francisco, Freeman and Co., 1971.

tantes à long terme sur la structure génétique. La taille des familles (c'est-à-dire le nombre de gènes que les parents auto-reproduisent) était autrefois fonction des capacités biologiques du couple; elle dépend de plus en plus de ses intentions familiales. Quels que soient les motifs de ces intentions, le mécanisme même de l'évolution est transformé. Cherchons à préciser certaines conséquences génétiques de la régulation démographique.

Age des parents

69. La généralisation de la régulation des naissances entraîne le plus souvent une certaine diminution des âges moyens des parents lors des naissances, et surtout un très sensible rétrécissement de la plage de dispersion de ces âges.

70. Les données concernant le Japon, citées par Matsunaga [7], sont particulièrement éloquentes : la proportion de naissances chez des femmes de moins de 20 ans était de 6 p. 100 en 1925, elle n'était plus que de 1,2 p. 100 en 1968, simultanément les naissances chez les femmes de plus de 35 ans passaient de 20,5 p 100 à 4,8 p. 100, la moyenne des âges des mères lors des naissances marquait une légère diminution, de 28,9 ans à 27,6 ans tandis que leur variance était ramenée de 45,5 à 17,8.

71. Cette concentration des naissances sur une courte période de la vie féconde des femmes, pratiquement de 20 à un peu plus de 30 ans, peut avoir des conséquences génétiques importantes car les anomalies des enfants sont un peu plus fréquentes, semble-t-il, chez les très jeunes femmes, et beaucoup plus chez les plus âgées : la courbe représentative de l'incidence de ces anomalies, en fonction de l'âge, a une forme de J.

72. L'on sait, par exemple, quelle rapide augmentation subit le nombre de naissances de mongoliens lorsque l'âge de la mère dépasse 35 ans. Matsunaga a pu calculer que la modification du régime de la procréation au Japon a, à elle seule, fait diminuer de 40 p. 100 la proportion de telles naissances.

73. On ne peut cependant affirmer que, pour autant, l'évolution du patrimoine génétique soit modifiée : en régime "naturel" les mongoliens sont sans doute plus nombreux qu'en régime "planifié", mais il s'agit d'accidents individuels sans conséquence biologique collective puisque ces mongoliens ne se reproduisent pas; la même constatation vaut pour les divers accidents chromosomiques, liés à l'âge de la mère, qui donnent naissance à des êtres incapables de se reproduire.

74. Le cas des mutations est tout autre. Malgré l'insuffisance de nos connaissances en ce domaine, il semble possible d'affirmer que la proportion des gènes mutés croît rapidement avec l'âge du père, surtout après 35-40 ans. L'effet d'une diminution de l'âge à la procréation peut donc être extrêmement marqué à long terme, même si, en raison du caractère récessif de nom breuses mutations, aucun changement n'apparaît a cours des premières générations.

75. Or, la régulation des naissances semble entraîne pour les hommes également une légère diminution d l'âge moyen lors de la procréation et surtout une dimi nution de la variance de cet âge. Ainsi au Japon, d'aprè les données de Matsunaga cet âge moyen est passé d 32.5 ans en 1952 à 30.8 en 1968, sa variance étan réduite simultanément de 45,4 à 21,2; la proportion d naissances issues de pères âgés de plus de 35 ans qu était de 32,2 p 100 en 1952 n'était plus que de 15, p 100 seize ans plus tard, ce qui peut entraîner un diminution importante de la chance de transmission de mutations qui apparaissent à chaque génération

76 Cette diminution du nombre de mutations est elle favorable ou défavorable ? Sans doute la plupar des mutations que nous décelons sont-elles détério rantes, les éviter est donc un bien, mais les mutation dans leur ensemble, constituent le matériau de l'évo lution, de l'adaptation biologique, si l'homme avait l pouvoir de les supprimer totalement, il jouerait à cou sûr, ce faisant, contre son propre avenir. Il n'est ains guère possible de décider si le recul du taux effectif de mutations entraîné par l'abaissement de l'âge des pa rents, est, finalement, bénéfique ou non

Variance de la taille des familles

77. Dans un régime dit "naturel", le nombre moyer de naissances par femme est de l'ordre de 7 à 9, mai la mortalité infantile est d'un tel niveau que seuls 2 ou 3 d'entre eux parviennent à l'âge procréateur La pre mière révolution démographique a réduit cette mortalité entraînant l'explosion démographique que l'on connaît la seconde révolution généralisant la planification fa miliale, ramène le nombre des naissances au niveau initial des enfants utiles.

78 Si l'on compare les moyennes des tailles des fa milles, le changement est donc finalement de peu d'importance (aucune population ne peut d'ailleurs con naître durablement un régime qui ne soit pas voisin de l'équilibre); mais il n'en est pas de même si l'on compare les variances de ces tailles. Ces variances son fonction du processus qui aboutit à la constitution des familles; malheureusement, si les démographes inté ressés par l'évolution de l'effectif global d'une popu lation ont raffiné les mesures de la fécondité et de la mortalité permettant d'analyser la moyenne du nombre d'enfants, ils ont porté peu d'attention à sa variance; les statistiques en ce domaine font cruellement défaut, tout au plus peut-on se baser sur certains exemples pour estimer la modification de la variance lors du passage du régime naturel à un régime de procréation contrôlé Nous en citerons deux exemples :

(*a*) Pour l'ensemble des femmes blanches améri caines nées vers 1870, la moyenne du nombre total d'enfants a été de 3,9, sa variance de 10, tandis que pour celles nées vers 1930, la moyenne a été de 3,1 la variance de 4. Il est vraisemblable que pour le nom-

[7] E. Matsunaga, "Possible genetic consequences of family planning", *Journal of the American Medical Association*, vol. 198 (1966), p. 533 540

bre d'enfants "utiles" la modification essentielle a été, de même, la chute de la variance;

(*b*) Dans son étude de démographie historique portant sur les 19 familles ayant constitué la "Bourgeoisie de Genève", L. Henry[8] a analysé la natalité et la mortalité pour chacun des 903 couples ayant participé à ce groupe depuis le XVII[e] siècle. A partir de ses données, on peut calculer avec précision le nombre d'enfants "utiles" de chacune des fratries. La comparaison des 139 couples dont le mari était né entre 1600 et 1650 et des 109 couples pour lesquels cette naissance avait eu lieu entre 1850 et 1900 montre à quel point le passage à un régime de procréation contrôlé a réduit la variance :

	Naissances		*Enfants utiles*	
Date de naissance du mari	*Nombre*	*Variance*	*Nombre*	*Variance*
1600-1650	5,5	20.0	3,1	7,0
1850-1900	2.0	3,2	1,9	2,9

79. Cette homogénéisation des tailles des familles a des conséquences à long terme sur l'évolution du patrimoine génétique. Sans entrer dans des démonstrations mathématiques rebutantes, nous essaierons de mettre ce phénomène en évidence en considérant les cas extrêmes de deux populations *A* et *B*, dans lesquelles la moyenne du nombre d'enfants utiles par famille est de deux, mais telle que :

(*a*) Dans la population *A* : toutes les familles ont deux enfants (la variance de ce nombre est donc nulle);

(*b*) Dans la population *B* : la moitié des familles ont quatre enfants, la moitié en ont zéro (la variance est donc égale à 4).

80. Nous pouvons voir aisément que, toutes choses égales par ailleurs, ces populations diffèrent en ce qui concerne la fréquence de mariages consanguins, la dérive au hasard du stock génétique, et la rapidité de l'évolution. Dans la population *A*, tout enfant a deux parents qui appartiennent à des fratries de deux enfants, il a donc deux oncles ou tantes et par conséquent quatre cousins germains; dans la population *B*, tout enfant à deux parents qui appartiennent à des fratries de quatre enfants (personne ne peut appartenir à une fratrie de zéro enfant), il a donc six oncles et tantes et, en moyenne, 12 cousins germains. La probabilité d'épouser une cousine est donc, en l'absence de règles de choix du conjoint, trois fois plus élevée dans *B* que dans *A*, et ce même rapport vaut pour toutes les formes de mariages consanguins.

81. De même, considérons un des deux gènes portés, en un certain locus, par un individu; chaque fois qu'il procrée, la probabilité pour que ce gène ne soit pas transmis est égale à ½; s'il a n enfants utiles, la probabilité de non-transmission de ce gène est donc de $(½)^n$. Dans la population *A*, la probabilité pour un gène pris au hasard de ne pas être transmis est donc de $(½)^2 =$ 0,25; dans la population *B*, ce gène appartient une fois sur deux à un individu sans enfants, une fois sur deux à un individu qui en aura quatre, la probabilité de non-transmission est donc égale à: $½ \times (½)^0 + ½ \times (½)^4 = 0{,}53$: le rôle du hasard dans la transformation du patrimoine génétique, d'une génération à l'autre, est ainsi deux fois plus important dans *B* que dans *A*.

82. Enfin, supposons que, dans les deux populations, certaines forces sélectives soient à l'œuvre, favorisant certains génotypes dotés d'une plus grande fertilité naturelle : dans la population *A* ces forces ne pourront s'exprimer puisque les couples les plus fertiles limitent, comme les moins fertiles, leur progéniture à deux enfants; au contraire, dans la population *B*, une certaine corrélation pourra s'établir entre la fertilité et la taille de la famille, les gènes favorables se répandront. D'une façon générale on peut montrer que la variation de la valeur sélective moyenne d'un groupe, entre deux générations, est proportionnelle à la variance de la taille utile des familles.

83. Finalement, la réduction de la dispersion des tailles des familles, entraînée par la planification des naissances, a pour conséquence une modification importante du régime de transmission du patrimoine génétique : les mariages consanguins sont moins nombreux, le rôle du hasard dans la disparition de certains gènes est amoindri et surtout, la sélection naturelle ne peut plus s'exercer que dans des limites beaucoup plus étroites.

84. Quel que soit le modèle admis pour expliquer l'évolution biologique des populations, néo-Darwinisme basé sur la sélection ou dérive au hasard de gènes neutres, il faut donc constater que la deuxième "révolution démographique" risque d'avoir un impact beaucoup plus profond que la première; mais ces conséquences sont plus importantes encore si l'on admet l'action d'effets sélectifs car non seulement le mécanisme, mais les facteurs même de la sélection sont modifiés.

Modification des facteurs sélectifs

85. Si l'on admet le modèle néo-darwiniste, l'évolution des fréquences des gènes est gouvernée par leur valeur sélective : dans une population en régime de procréation naturel, les gènes liés à une fertilité plus élevée ou à une moindre mortalité infantile sont systématiquement favorisés, jusqu'à ce que s'établisse un équilibre fonction des conditions écologiques; le classement des familles selon le nombre des enfants utiles est le reflet du classement des couples procréateurs selon leur "valeur" adaptative.

86. En régime de procréation controlé, le nombre d'enfants est au contraire fonction, avant tout, des désirs des parents. La variance de la taille des familles, mesure du champ offert à la sélection, correspond aux différences entre les intentions des procréateurs plus qu'aux différences entre leurs possibilités biologiques. Des caractéristiques psychologiques se substituent ainsi

[8] L. Henry, *Fécondité des mariages*, Paris, Presses universitaires de France, 1953.

à des caractéristiques physiologiques; le mécanisme de l'évolution a non seulement perdu de sa puissance, du fait de la réduction de la variance des tailles des familles, il a aussi changé de nature : son action n'est plus orientée dans la même direction

87. Pour mettre cet effet en évidence, ayons recours, à nouveau, à un exemple extrême : imaginons une population où tous les couples aient exactement le nombre d'enfants qu'ils désirent. Ce nombre est évidemment fonction de multiples facteurs culturels ou économiques, mais il est fort possible qu'il soit aussi lié, dans une certaine mesure, à des facteurs biologiques, eux-mêmes sous la dépendance de certains gènes Les gènes en cause sont soumis à des forces sélectives extrêmement puissantes : ceux liés au désir d'avoir beaucoup d'enfants se répandent rapidement au détriment de ceux liés au désir d'en avoir peu ou pas. Dans une telle population tous les individus posséderont ainsi après quelques générations, des gènes leur apportant une forte propension à désirer beaucoup d'enfants La limitation des naissances aboutit alors, paradoxalement, à une explosion démographique nécessitant une nouvelle "révolution" dont on ne voit guère la nature.

L'EUGÉNIQUE EN QUESTION

88. Toute connaissance débouche sur l'action, dans le domaine génétique cette action consiste à diriger ce qui avait été laissé jusqu'ici à la discrétion soit de forces sélectives encore mal connues, soit du hasard, à transformer sciemment l'essence biologique de notre propre espèce.

89. Dès les premiers développements de la génétique, au cours surtout des années 1930, des théories eugéniques fondées sur ces nouvelles connaissances scientifiques ont été élaborées Des savants aussi éminents que Fisher [9] ont développé des arguments apparemment convaincants sur les conséquences d'un laisser-aller en matière de reproduction : les classes

ses inférieures sont ceux qui ont été vaincus dans la lutte pour la vie et ont, par définition, la moins bonne valeur sélective.

90 L'utilisation démentielle de concepts génétiques pour justifier des politiques racistes (ainsi Vershuer [10], directeur de l'Institut d'anthropologie et hérédité humaine de Berlin, justifiant la "solution nationale-socialiste de la question juive" et annonçant *in fine*, en 1943, "la question tzigane sera bientôt réglée") a jeté sur ce genre de raisonnement un discrédit suffisant pour que, pendant un temps, les généticiens ne soient pas invoqués par les politiciens.

[9] R A Fisher, *The Genetical Theory of Natural Selection*, Oxford, Clarendon Press, 1930

[10] O Von Vershuer, *Manuel d'eugénique et hérédité humaine*, Paris, Masson et Cie, 1943

91. Mais les progrès mêmes de nos connaissances ouvrent des voies nouvelles où s'engouffrent sans retenue visionnaires et exploiteurs :

(*a*) La découverte du mécanisme par lequel l'information portée par les chromosomes est traduite en chaînes polypeptidiques permet d'imaginer qu'un jour certains défauts génétiques pourront être corrigés, qu'une information nouvelle pourra être incorporée dans l'ADN;

(*b*) Les techniques d'amniocentèse, la fertilisation extra-utérine, la sélection des spermatozoïdes pourraient permettre de choisir les gènes transmis à l'enfant, notamment de choisir son sexe;

(*c*) Le "cloning", c'est-à-dire la réalisation d'un jumeau identique (mais plus jeune) à partir d'une cellule, permettra de multiplier les êtres les plus doués, sans attendre que le hasard reconstitue la combinaison génétique favorable dont ils bénéficient

92. Le danger d'une utilisation perverse de ces connaissances est si grand (et l'exemple de l'usage des découvertes de la physique atomique est si présent) que certains hommes de science ont proposé d'arrêter toute recherche en génétique. Le récent Congrès international de génétique de Berkeley (août 1973) a montré que, effectivement, tout un courant de pensée se développe pour fonder dès maintenant sur des données génétiques des mesures autoritaires de régulation démographique. Les discussions se sont particulièrement développées autour de la notion de Quotient Intellectuel · le Q I est-il une mesure de l'intelligence ? Est-il génétiquement déterminé ? Est-il différent selon les "races" ? On imagine aisément les prolongements de telles questions [11]

93 Pour mettre en évidence la difficulté de dégager des conclusions réellement fondées, évoquons deux problèmes dont la solution est un préalable à toute mesure eugénique.

"Bons" et "mauvais" gènes

94. Au niveau de l'individu cette question peut sembler avoir une réponse assez claire : il est préférable de ne pas avoir un gène entraînant une maladie grave, un tel gène est donc "mauvais".

95. Ce raisonnement méconnaît un aspect fondamental des individus diploïdes que nous sommes : chacune de nos caractéristiques biologiques est sous la dépendance non d'un gène mais de deux gènes; même si nous sommes capables de classer en "bonnes" et "mauvaises" ces caractéristiques biologiques, nous ne savons classer que des associations de deux gènes, et non les gènes eux-mêmes. Prenons un exemple : nous avons vu que la mucoviscidose est due à un gène récessif m qui est, fort probablement, avantageux à l'état hétérozygote; nous pouvons donc classer les trois génotypes : *mm*, mauvais; MM, bon; M*m*, meilleur. Mais cette constatation ne nous permet en aucune manière de classer le gène *m* et le gène M.

[11] A. Jensen, "Environment, heredity ligen *Harvard Educational Review*, 1969.

96. Il en est même pour le gène de l'hémoglobine S en pays impaludé, et, de façon générale, de tous les gènes qui entraînent un avantage de l'hétérozygote.

97. Au niveau de la population et dans une vue à long terme, la question est, plus encore, dépourvue de sens. Tel génotype peut fort bien être avantageux dans un certain environnement, défavorable dans un autre, or celui-ci peut changer rapidement; un groupe qui ne posséderait plus que le génotype le mieux adapté au milieu dans lequel il vit à un certain moment, ne pourrait s'adapter à une modification de ce milieu, et serait condamné.

98. Mais surtout, nous l'avons vu, de nombreux locus ne sont soumis à aucune force sélective, leur structure génique évolue au hasard, ce qui peut entraîner de très importantes variations de fréquence d'un groupe à l'autre (Steinberg [12] cite le gène K du groupe sanguin Kell dont la fréquence varie de 0 à 22 p. 100, dans divers groupes, ayant pourtant le même mode de vie, dans le même milieu, d'un isolat religieux des Etats-Unis).

99. Cette importance nouvelle donnée à la dérive, au détriment de la sélection, mène à une vue de l'évolution humaine bien différente de celle basée sur la "lutte pour la vie" et la "survivance du plus apte". A la limite, non en prétendant décrire la réalité, mais pour élaborer un modèle extrême, servant de référence, on peut imaginer que le patrimoine biologique humain a été presque insensible aux changements de comportements ou de milieux, trop rapides pour l'influencer; il ne s'est modifié qu'au hasard des mutations et de la dérive. L'homme biologique est une structure vide habitée par l'homme culturel; c'est l'homme culturel qui s'est adapté, qui a utilisé au mieux le matériau qui lui était donné, mais il n'a pu jusqu'à présent le transformer.

100. Quel sens peut avoir alors la notion de "bon" gène ?

Choix entre l'individu et la société

101. Bien souvent une mesure favorable à l'individu ou à sa progéniture peut se révéler néfaste pour la société. Ainsi une femme dont le père était hémophile sait qu'elle porte le gène de cette maladie sur l'un de ses deux chromosomes X (mais n'en souffre pas en raison du caractère récessif de ce gène). Elle sait que ses fils seront hémophiles; pour éviter ce danger elle peut décider de n'avoir que des filles (ce qui peut être réalisé soit par détermination du sexe du fœtus et avortement, soit, dans un avenir sans doute proche, par sélection des spermatozoïdes porteurs d'un chromosome X); ce faisant, elle assure dans l'immédiat la santé de ses enfants mais contribue à accroître la fréquence du gène défavorable dans la population car ses filles, non atteintes, auront en moyenne plus d'enfants que n'en auraient eu des garçons soumis à une sévère sélection.

102. De même dans les pays où le gène S de l'anémie falciforme est répandu, on a préconisé de s'opposer aux mariages entre hétérozygotes AS, ce qui est aisé car un simple examen du sang permet de les détecter. En effet, un quart des enfants des couples AS × AS sont homozygotes SS et sont condamnés à une anémie mortelle, alors que les couples AS × AA n'ont que des enfants sains. Une telle mesure élimine certes dans l'immédiat la maladie en cause, mais elle entraîne un accroissement de la croissance du gène S : celui-ci est en effet en équilibre en raison de la valeur sélective meilleure des hétérozygotes "AS" (résistant au paludisme) qui compense la disparition par anémie des homozygotes "SS"; en supprimant ces derniers on rompt l'équilibre au profit du gène défavorable.

103. De façon générale, chaque fois qu'une mesure eugénique tend à remplacer un enfant homozygote taré, donc peu capable de procréer, par un hétérozygote sain, de fertilité normale, ce gain individuel immédiat est payé par un accroissement de la fréquence du gène, donc par une détérioration à long terme du patrimoine biologique collectif.

104. Une politique eugénique ne peut se développer que si des choix clairs sont opérés, si des réponses sont données honnêtement à ces questions.

CONCLUSION

105. Ce rapide tour d'horizon montre l'importance et l'urgence des problèmes auxquels sont confrontés les "généticiens de population", que l'on pourrait appeler "démographes de la génétique".

106. Avant tout, il faut insister sur l'insuffisance des connaissances actuelles; le pire danger est celui de décisions qui pourraient être adoptées en prenant pour certitude scientifique ce qui n'est qu'hypothèse d'école, pour explication définitive ce qui n'est qu'un modèle partiel et provisoire.

107. L'Année mondiale de la population pourrait être l'occasion de faire le point des problèmes en suspens, de multiplier les contacts encore insuffisants entre les généticiens et les démographes, d'encourager certaines recherches dans des domaines où les connaissances sont balbutiantes. Ces recherches seront certes menées par des biologistes, mais les équipes nécessaires devront comporter des mathématiciens (élaboration de modèles plus complexes), des ethnologues (étude de la dynamique des petites populations), des anthropologues (mesure de l'adaptation au milieu) et surtout des démographes.

108. L'enjeu est d'importance, il s'agit de l'avenir de notre espèce que, peut-être prochainement, nous allons prendre en charge. Si les progrès scientifiques nous permettent de devenir de "nouveaux Pygmalions" [13],

[12] A. G. Steinberg *et al.*, "Genetic studies on an inbred isolate", *Proceedings of the Third International Congress of Genetics*, Baltimore, Maryland, Johns Hopkins Press, 1967.

[13] J. de Grouchy, *Les nouveaux Pygmalions*, Paris, Gauthier-Villars, 1972.

façonnant à notre volonté l'homme futur, quel objectif donnerons-nous à notre action ?

109. Certains cas limites ne poseront, certes, guère de problèmes : éliminer les gènes de l'idiotie phénylpyruvique ou du nanisme chondrodystrophique ne pourrait être que bénéfique, supprimant un scandale de souffrances inutiles. Mais le plus souvent, aucun critère ne permettra de désigner les gènes favorables; cette qualification a-t-elle d'ailleurs un sens ?

110. La notion de "bon" et "mauvais" correspond à un manichéisme simpliste que dément la complexité du monde vivant. La richesse biologique d'un individu est moins dans les gènes favorables qu'il possède que dans la complexité des apports de son père et de sa mère; la richesse d'un groupe moins dans ses génies que dans son hétérogénéité; la richesse de l'espèce humaine moins dans les sociétés qui ont su se montrer efficaces que dans leur diversité. Un des objectifs d'un éventuel programme eugénique devrait donc être, avant tout, de préserver cette variabilité.

111. L'essentiel est de comprendre que l'autre, personne ou *société*, nous est d'autant plus précieux qu'il nous est plus dissemblable.

Part Three

DEMOGRAPHIC DATA COLLECTION, RESEARCH AND TRAINING

THE AVAILABILITY OF DEMOGRAPHIC STATISTICS THROUGHOUT THE WORLD

United Nations Secretariat *

1. This paper is a brief summary of the current status of basic demographic data collection throughout the world It covers statistics on population size and composition, on births and deaths and on international migration. [1]

2. The paper is based on information available in the Statistical Office of the United Nations For population size and composition and for births and deaths, the basic source is the individual country replies to three annual United Nations questionnaires on which the actual data are called for Two of these questionnaires relate to national population census data (one on general characteristics of the population and the other on economic characteristics) and the third is concerned with vital statistics This body of data is augmented by further statistics derived from various official national publications. For international migration, the basic source has been a special inquiry addressed to national statistical offices on the kinds of data collected and tabulated and the methods of collection. Thus, the conclusions reached are derived from official statistics available to the Statistical Office and information provided by central statistical offices on the sources of national data

Population size and composition

Sources of national data

3. The traditional sources of data on population size and composition are population censuses and sample surveys The former consist of "the total process of collecting, compiling, evaluating, analysing and publishing demographic, economic and social data pertaining, at a specified time, to all persons in a country or in a well-delimited part of a country". [2] Population censuses are primary sources of the basic national population data required for planning and administration, as well as for many aspects of economic and social research

4 Sample surveys can serve as an interim source of information during a period of transition to a complete census, but they may also serve as a major source of information on a more permanent basis, particularly for the provision of intercensal estimates and for the investigation of topics in greater depth than is usually possible in a population census.

5 Sample surveys whose results can be properly interpreted and whose sampling errors can be evaluated must be based on probability sampling principles Depending upon the sampling plans, such surveys usually yield satisfactory national or other large-area estimates but they are not suitable for estimated quantities pertaining to small local areas Where such local estimates are indispensable, only a complete enumeration will suffice. On the other hand, sampling will, as a rule, pose a lesser burden on both personnel and financial resources, and sample surveys are likely to take less time.

6. Until recently, relatively few sample surveys of national scope have been taken and the adequacy of the samples used has varied from country to country It has not, therefore, appeared significant to summarize here the extent of the use of sample surveys. On the other hand, the population census as a basic source of population statistics has long been recognized, and it is interesting to see how the actual counting of the population of countries has increased over time. Table 1 therefore, shows for the world and continents the number of countries that took censuses during the decades 1945-1954 and 1955-1964, and that have taken or plan to take censuses in the decade 1965-1974. It also shows the percentage of world and continental population covered by these censuses. There has been an encouraging increase in the number of censuses taken over this period, from a total for the 1950 decade of 150 to 174 in the 1960 decade, to a possible 193 for the 1970 decade, out of the total number of 223 countries in the world The percentage figures, unfortunately do not show a similar increase. While the percentage of the world population covered by censuses in the 1950 decade was 81, it was only 72 in the period 1955-1964 and, according to currently known plans and performance, will not exceed 75 in the 1970s. In terms of continents, the increase in the number of countri

* Statistical Office of the United Nations

[1] The discussion presented here is limited to international [illegible]

para 8.

TABLE 1. NUMBER OF COUNTRIES TAKING A NATIONAL CENSUS BY 10-YEAR PERIODS FROM 1945 TO 1974 AND PERCENTAGE OF WORLD AND CONTINENTAL POPULATION COVERED BY THESE CENSUSES

Continent	Number of countries	Total population (millions)	At least one census held during decade			Announced plan for census to be held before end of decade			No census during decade		
			Number of countries	Population (millions)	Percentage of total population	Number of countries	Population (millions)	Percentage of total population	Number of countries	Population (millions)	Percentage of total population
					1945-1954						
World	223	2,486	150	2,009	81	...	...	...	73	476	19
Africa	57	217	24	118	54	...	...	...	33	100	46
America, North	36	218	32	217	99	...	...	...	4	2	1
America, South	15	110	12	100	91	...	...	...	3	10	9
Asia	46	1,355	23	1,172	87	...	...	...	23	183	13
Europe	41	392	40	392	100	...	...	...	1	0	0
Oceania	27	13	19	11	85	...	...	...	8	2	15
USSR	1	180	—	—	—	...	...	...	1	180	100
					1955-1964						
World	223	2,982	174	2,142	72	...	...	...	49	840	28
Africa	57	270	36	172	64	...	...	...	21	97	36
America, North	36	267	34	256	96	...	...	...	2	11	4
America, South	15	145	13	141	97	...	...	...	2	4	3
Asia	46	1,645	30	920	56	...	...	...	16	725	44
Europe	41	425	38	425	100	...	...	...	3	0	0
Oceania	27	16	22	14	87	...	...	...	5	2	13
USSR	1	214	1	214	100	...	...	...	—	—	—
					1965-1974 [a]						
World	223	3,635	170	2,559	70	23	166	5	30	910	25
Africa	57	344	32	182	53	17	127	37	8	36	10
America, North	36	321	34	313	97	1	3	1	1	5	2
America, South	15	190	10	161	85	4	29	15	1	0	0
Asia	46	2,056	31	1,181	58	1	8	—	14	867	42
Europe	41	462	37	462	100	—	—	—	4	0	0
Oceania	27	19	25	17	88	—	—	—	2	2	12
USSR	1	243	1	243	100	—	—	—	—	—	—

Note: This table takes into account only complete enumerations of the population. Enumerations on a sample basis are not considered to be "censuses". The table is based on countries and territories existing in May 1973 and is therefore not affected by changes in their numbers from period to period. All population figures used are the relevant mid-decade (i.e., 1950, 1960, 1970) estimates shown in the working paper "Total population estimates for world, regions and countries, each year, 1950-1985" (ESA/P/WP.34) prepared by the Population Division, Department of Economic and Social Affairs, except for the world total for 1970, which is the sum of the continental totals rather than the adjusted total of 3,632 million.

[a] Information available on 31 May 1973. Censuses counted as already held during the decade include those for which enumeration was under way as of that date.

taking a census has been greatest in Africa (from 24 to 36 to a likely 49), the increase since 1960 being to a great extent, no doubt, the result of the African Census Programme [3] sponsored by the United Nations. This has been accompanied by a significant increase in the percentage of the population covered, from 54 per cent in the 1950 decade to a possible 90 per cent in the 1970 decade. In Oceania, the increase from 19 to 25 countries conducting a census has made little or no difference in the percentage of the population covered, while in Asia, an increase from 20 to 30 to 32 in the number of countries taking a census has occurred at the same time that the percentage of the population covered has declined from 87 to 56.

Availability of statistics

7. An international comparison of the data available in nation-wide censuses shows considerable progress in this area despite the fact that much remains to be done.

8. The situation is considerably less satisfactory when it comes to coverage for specific population characteristics. The Statistical Office does not yet have enough information on the 1970 round of censuses to make a full evaluation; but, on the basis of what is available, it appears that coverage in this round is little different from that of the previous round, which is summarized in table 2.

9. As may be seen from the table, the 1960 round of national censuses made information available for some two thirds of the world's population on the size

[3] A programme undertaken in accordance with recommendations of the Population Commission at its sixteenth session and by the United Nations Economic Commission for Africa at its tenth session. See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 3*, paras. 128 and 135; and *ibid., Fifty-first Session, Supplement No. 5*, para. 330.

TABLE 2. PERCENTAGES OF POPULATION FOR WHICH SPECIFIED DATA ARE AVAILABLE FROM POPULATION CENSUSES TAKEN DURING THE PERIOD 1955-1964: THE WORLD AND EACH CONTINENT

	World	Europe	South America	North America	Oceania	Africa	Asia
1. Size of population	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2. Civil divisions	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3. Capital and cities of 100,000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4. Sex	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5. Age (grouped)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6. Rate of population growth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7. Urban-rural	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8. Sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9. Locality-size groups	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10. Households (average size)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11. Marital status	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12. Sex and age, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13. Age, urban-rural population	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14. Marital status and age	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15. Level of education	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16. Age (single years)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17. Households (type and size)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18. Industry and sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19. Occupation and sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20. Functional category and sex, inactive population	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21. Status and sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22. Industry, sex and age, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23. Illiteracy	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24. Industry, status and sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25. Functional category, sex and age, inactive population	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26. Country of birth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27. Country of citizenship	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28. Literacy and age	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29. Language	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30. Religion	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31. Occupation, sex and age, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32. Occupation, status and sex, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33. School attendance	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34. Females by age and children born alive	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35. Marital status, economically active females	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36. Marital status and age, economically active females	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37. Status, sex and age, economically active	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38. Ethnic composition	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39. Females by age and children living	3	[illegible]	—	[illegible]	[illegible]	[illegible]	[illegible]

Note. Sub items are arranged in descending order of the percentages for the world.

of the total population and its distribution by major civil divisions, the population of national capitals and cities of 100,000 or more inhabitants, the urban-rural distribution of the population, age groupings and the total economically active population.

10. Steadily lower proportions were reported for various other characteristics, particularly ethnic and fertility items, and the bulk of the economic and educational items. Coverage for that very important indicator of fertility consisting of females by age by children born alive related, for example, to only a fifth of the world population.

11. Comparing continents with a view to separating them into two broad groups—those which in terms of inclusion of the particular item w[illegible] [illegible] [illegible] falling below the world [illegible]

Africa, 92 per cent of the items were below average, and in Asia, about 90 per cent; in other words, for only 8 per cent and 10 per cent of the items, respectively, did the two continents rank above average. In the other four continents, item coverage was generally above average; in North America and in Europe, this above-average item coverage accounted for 87 per cent; in Oceania, for about 85 per cent; and in South America, for about 79 per cent of all the items.

12. Of course, such a simple comparison can have its pitfalls: a particular item is not likely to be of equal significance in every country or continent, nor does the proportion for which a particular characteristic is ascertained say anything about the quality of the information obtained. Nevertheless, the table does suggest that most of the developing countries are seriously lacking in many, if not most, of the census data necessary to a variety of planning and policy-making activities.

Quality of the data

13. Up to the present, it has not been possible for the Statistical Office of the United Nations systematically to evaluate the quality of the national census and sample survey data which it receives. Reliance has had to be placed for the most part on national estimates of underenumeration, often provided without indication of how the estimates were arrived at. Even when it can be assumed that the extent of coverage error has been properly assessed, details on the segments of the population omitted from the enumeration and the scope of error in the information collected on the characteristics of the persons enumerated is generally lacking. In a few cases, where national or United Nations estimates of total population size for years proximate to a census or survey are markedly out of line with the census or survey totals, or where totals from successive censuses show unexplained deviations, this is called to the attention of the users of the Statistical Office compendia of national data.

14. A factor sometimes considered to be a good indication of the general quality of a census is the use of a post-enumeration sample field check for ascertaining the level of coverage in the general enumeration and (in some instances) the accuracy of the information on characteristics of the population. It would, however, be more proper to consider merely the use of a post-enumeration check to be an indication only of the interest of the national statistical authorities in ascertaining the reliability of the census results because it cannot automatically be assumed that the methodology employed in the check itself is of a high enough quality to provide reliable estimates of census coverage. Nevertheless, it may be noted that only a fifth of the national censuses taken during the 1955-1964 round included such a survey, while only 14 per cent of the national censuses taken or planned for the current round do or plan to do so. However, it is possible that this percentage will be raised somewhat before the current round is completed, as many countries have yet to report to the Statistical Office on this particular aspect of their census-taking. In fact, information is lacking on this matter for 18 countries taking or planning to take a census this decade, which conducted a post-enumeration survey as part of their 1960-round censuses. Nevertheless, were all 18 of those to conduct post-enumeration surveys in the current round, it would still raise the population for which this was done to but 25 per cent of the total.

Births and deaths

Sources of national data

15. Civil registration is defined "as the continuous, permanent, compulsory recording of the occurrence and the characteristics of vital events . . . . Civil registration is carried out for the value of the legal documents as provided by law. However, the usefulness of these records as a source of statistics, is becoming increasingly recognized." [4]

16. The primary vital events determining population movements are live births (which constitute additions to population) and deaths (which constitute subtractions). As these are, unlike census data, in the nature of flow statistics, it can be readily understood why it is desirable that the recording of these components of population change be on a continuing basis. Registration systems for vital events have, accordingly, a long history—one that goes back, in fact, to the seventeenth century, in Finland and the three Scandinavian countries. Today, nation-wide systems for the civil registration of births and deaths cover—at least in intent—more than two fifths of the world population. The least coverage is in Asia and Africa, where it extends only to some 15 per cent and 33 per cent of the population, respectively; while the greatest coverage is in Europe and the Union of Soviet Socialist Republics, where it is 100 per cent, and North America, where it is 98 per cent.

17. Where civil registration is seriously defective or non-existent, useful current estimates have been obtained by the application of sampling, for example, by a sample registration area scheme, by sample household surveys, or by a combination of these two methods, i.e., a "dual-record system". A sample registration area is not a substitute for complete nation-wide registration; but, depending upon national circumstances, it can serve variously to promote development of a comprehensive civil registration system, to measure completeness of registration in an existing system, as a testing and experimental laboratory, to provide vital rates for the sample areas and, if it constitutes a probability sample, vital rate estimates for the whole country. Registration procedures for recording vital events, whether carried out on a sample basis or with a national

[4] *Principles and Recommendations for a Vital Statistics System* (United Nations publication, Sales No. E.73.XVII.9), para. 278.

civil registration system, have the notable advantage of being able to record information about vital events soon after they occur. Such promptness serves to increase the completeness of the registration system as well the quality of information obtained about some items investigated. However, not all countries can afford a scientifically designed sample registration system as forerunner to a comprehensive system or for any other purposes.

18. Information on vital events has also been obtained by sample household surveys. If carefully executed, such surveys have been shown to produce satisfactory estimates of vital rates for a given year; but they do not, of course, provide a consistent flow of statistics which will permit an analysis to be made of the trend of vital events Furthermore, neither the sample survey nor the sample registration procedure can provide statistics for the many individual local areas needed for the proper administration of various types of public health programmes Only a full civil registration system can provide this type of data On the other hand, household sample surveys can very usefully be used to obtain detailed information on topics that cannot be investigated using data from the civil registration system.

19. Table 3 throws light on the relative use made of civil registration and sample surveys as sources of birth statistics. The former is the source of information on number of live births for nearly three fifths of the population for which such information is collected, and the latter for slightly more than two fifths But there are substantial differences by continent. Registration is the exclusive means in North America, Europe, Oceania and the Soviet Union, while sample surveys take precedence in Africa and, particularly, Asia.

TABLE 3 PERCENTAGES OF WORLD AND CONTINENTAL POPULATION FOR WHICH BIRTH STATISTICS ARE AVAILABLE, WITH INDICATION OF SOURCE OF DATA, AS OF 1971

		Source of data		
		Civil registration		Sample surveys
World and continents	Total	Total	"Complete" a	Total
World	77	43	33	34
Africa	72	33	10	39
America, North	98	98	92	—
America, South	51	51	20	—
Asia	68	15	6	53
Europe	100	100	100	—
Oceania	87	87	80	—
USSR	100	100	100	—

a Classified as "complete" if evidence indicates that at least 90 per cent of the births are registered

Availability of statistics

20. As might be expected, the situation with reference to the registration of vital events parallels that for census coverage Here, too, the developing countries would appear to lack many of the data necessary to various planning and policy-making activities

21 With respect to fertility, one may see in table 4, which is a summary table derived from table 7 (see annex), first, the limited coverage in the developing countries; and, secondly, the reduction in this coverage as one proceeds from the total numbers of births to the more complex breakdowns and subcategories. Such a

TABLE 4 PERCENTAGES OF POPULATION FOR WHICH SPECIFIED NATALITY DATA ARE AVAILABLE THROUGH EITHER CIVIL REGISTRATION OR SAMPLE SURVEY: THE WORLD AND EACH CONTINENT

	World	Europe	North America	Oceania	Africa	Asia	South America
General fertility							
1 Annual totals	77	100	98	87	77	68	51
2 Age of mother	47	100	98	86	29	25	51
3 Sex	41	100	98	86	24	14	49
4 Birth order	36	92	94	83	17	10	33
5. Birth order by age of mother	34	92	78	83	16	10	33
6 Legitimacy status	30	96	95	81	28	7	48
7. Legitimate births by age of mother	26	95	78	80	13	7	31
8 Type	22	72	91	80	4	6	14
9 Legitimate births by age of father	18	90	11	80	8	7	11
10. Age of mother and sex	18	64	72	80	5	5	5
11 Age of father	17	38	78	69	15	2	38
12. Duration of marriage	15	88	1	79	6	5	6
13. Occupation of father	7	23	1	79	1	5	6
Urban/rural fertility							
14 Annual totals	27	53	93	80	19	5	7
15. Age of mother	7	48	3	1	7	—	

Note Stub items are arranged in descending order of the percentages for the

reduction in vital statistics coverage—which is more pronounced in the developing than the developed countries—is hardly surprising. As with census coverage, it indicates the gradually increasing difficulty many Governments encounter in producing figures requiring more detailed information—figures based on finer breakdowns and taxonomies—than those required merely for grand totals. Unfortunately, these more complex pieces of information are often required for answering and solving various important and involved questions and problems for which a mere head count may furnish a necessary but hardly sufficient information base. For example, the very low coverages in the countries of Africa, South America and Asia (5, 7 and 19 per cent, respectively) with respect to nothing more detailed than numbers of births by urban/rural residence renders impossible any calculation of geographically differentiated birth rates, which, in turn, adds considerably to the difficulty of diagnosing patterns of excessive population growth when measures are contemplated for investigating the social or economic consequences of population increase, or when a policy is to be developed on urbanization.

22. As to data on mortality, table 5, which summarizes data given in table 8 (see annex), would appear to indicate that basic coverage for the incidence of death closely parallels that for births, both for the world as a whole and for the individual continents and that, as with information on births, coverage declines as one proceeds to the more complex breakdowns and subcategories, with urban/rural categorization, which hardly exists outside North America, even less extensive than it is with births. Coverage for infant mortality is substantially lower than that for all deaths—almost entirely due to the slight coverage for infant deaths in Africa and, particularly, Asia. Other evidence suggests that there is a great deal of national variation in the relative coverage of births and deaths. Mortality, and particularly infant mortality, is often less completely reported than births.[5]

23. Of particular interest, given the increasing recognition of its existence and its significance to fertility control, are statistics on induced abortion—in the collection of which, because of the impossibility of obtaining accurate data on an illegal activity, the Statistical Office limits itself to those that have been legally induced.

24. To date, 22 countries, containing some 15 per cent of the world's population, have reported on this procedure. In addition, legal abortion is known to be available in certain other countries which have not made any statistics on the subject available to the United Nations—most notably China, the German Democratic Republic and the Soviet Union.

Quality of the data

25. Since under-reporting of vital events is frequently the most serious short-coming of registration systems, the Statistical Office of the United Nations,

[5] *Methodology of Demographic Sample Surveys* (United Nations publication, Sales No. E.71.XVII.11), p. 301.

TABLE 5. PERCENTAGES OF POPULATION FOR WHICH SPECIFIED MORTALITY DATA ARE AVAILABLE THROUGH EITHER CIVIL REGISTRATION OR SAMPLE SURVEYS: THE WORLD AND EACH CONTINENT

	World	*Europe*	*North America*	*Oceania*	*Africa*	*Asia*	*South America*
General mortality							
1. Annual totals	78	100	98	89	72	68	51
2. Age and sex	47	100	98	85	34	22	51
3. Monthly totals	45	100	98	85	21	21	46
4. Cause	32	99	98	81	17	11	51
5. Cause and sex	32	96	98	81	17	11	51
6. Marital status, age and sex	28	100	80	79	10	9	42
7. Cause, age and sex	27	87	94	79	7	8	47
8. Cause and type of certification	17	89	29	16	0	2	33
9. Occupation and age	11	47	4	80	10	5	6
Urban/rural mortality							
10. Annual totals	19	38	91	15	15	8	16
11. Age and sex	8	37	0	15	4	5	—
12. Cause, age and sex	3	19	0	15	—	—	—
Infant mortality							
13. Annual totals	53	100	98	87	56	30	51
14. Monthly totals	38	100	97	82	13	11	46
15. Age and sex	33	100	98	84	26	12	43
Urban/rural infant mortality							
16. Annual totals	16	38	73	15	14	7	3
17. Age and sex	2	19	0	1	1	—	—

Note. Stub items are arranged in descending order of the percentages for the world.

In publishing the [illegible]
Yearbook, has [illegible]
or as "unreliabl[illegible]
the evidence indicates that at least 90 per cent of the events are registered. Registration of a smaller percentage of events is indicated by their classification as "unreliable". The classification of a particular country is based on an evaluation of the quality of the data reported annually to the United Nations by the Governments, and was set up in 1956 on the basis of the responses by the responsible agencies of the Governments to a special inquiry on the completeness and accuracy of vital statistics data from civil registers This has been systematically extended and refined as new information on reliability became more generally available, either through correspondence or from relevant official publications Despite the fact that it has not been possible to apply uniform and objective criteria of reliability, or to classify each and every country, the two broad categories are useful in furnishing some indication of the quality of the statistics presented in the *Demographic Yearbook*.

26. A summary by continent of the results of this classification with respect to birth statistics is given in table 3, in the form of the percentage of the population of each continent living in countries in which birth registration is considered to be "complete". Clearly, the older established systems of registration provide better coverage, on a national basis, than systems more recently introduced or those restricted to small areas of a country, as evidenced by the complete coverage in European countries and the Soviet Union, the most complete coverage in North America and the considerably smaller coverage in other areas of the world.

27. Unfortunately, it has not been possible to provide a similar evaluation of the accuracy of fertility estimates based on the results of sample surveys. It is known that surveys are subject to sampling errors and biases, and also to the kinds of non-sampling errors that affect all statistical inquiries (e.g., errors due to inadequate preparation, errors of non-response, response errors) although the non-sampling errors are likely to be of lower magnitude in well-executed surveys than in censuses [6] Hence, the total percentages shown in the first column of table 3 are over-statements, not only because of incomplete reporting to civil registers, but because of omissions from sample surveys.

28. No comparable table has been prepared for mortality statistics As previously mentioned, it is probably safe to assume that the coverage percentages for mortality statistics would be somewhat lower than those of table 3.

International migration

Sources of national data

29. For present purposes, international migration is taken to mean a movement of the civilian population from one country to another, with accompanying change in residence Statistics on migration therefore do not include such categories as tourists, travellers, frontier traffic and short-term seasonal workers

30 Unlike the situation with respect to population and vital statistics, there exists in most countries no single, major system generating statistics on migration. The exceptions are, first, those few countries possessing population registers and, secondly, certain island nations maintaining close supervision over their ports of entry.

31 Most countries rely on frontier collection for statistics of international migration, despite the frequently sizable underenumeration and error associated with this particular method Frontier collection involves a variety of specific sources of information such as ship and aircraft manifests, statistics kept by police or immigration authorities involved in frontier control activities and passport statistics Surveys and population registers can also be a source of statistics on international migration In surveys, the information may be obtained by the inclusion of such questions as where the respondent resided on some specific date, how long he has resided at his present address and where he resided before coming to his present address. With population registers, statistics on migration are essentially a by-product obtained by special tabulations applied on the basis of some arbitrary definition as to who is or is not a "migrant". In countries whose census schedule includes a question on country of birth, the population census itself is also a possible source for immigration statistics The value of these census data is enhanced if a question is also included as to the date of arrival in the country of present residence.

Availability of statistics

32. Of all basic demographic statistics, surely those on international migration are the least developed in terms of scope, consistency and comparability. The Statistical Office, by means of an annual questionnaire, collects data on long-term (i.e., of more than one year's duration) immigrants and emigrants by age and sex and by country of last residence or intended residence. The statistics on country of last residence or intended residence have not been published since 1959 because of the lack of internal consistency in the data; the statistics by age and sex are subject to various limitations regarding coverage and definitions. International comparisons are therefore particularly difficult because of the variations in the definitions in use by the various countries and the quality of the data available.

33. Accordingly, instead of information on coverage and available data, information is presented in table 6 on the sources of international migration data—on the assumption that this is the more useful information for present purposes, given the highly varied character of these data at the international level. The table shows first, the percentage of the world and regional population in countries reporting any system of international migration data and that in

[6] *Ibid.*, pp 94-99.

TABLE 6. AVAILABILITY AND METHODS OF COLLECTION OF DATA ON INTERNATIONAL MIGRATION

	Total	*Africa*	*North America*	*South America*	*Asia*	*Europe*	*Oceania*	*USSR*
A. Percentages of world and regional population in countries reporting collection of data								
Reporting on migration statistics	48	58	86	68	22	89	92	100
Countries not reporting or reporting no collection	52	42	14	32	78	11	8	—
B. Percentage of population in countries reporting on migration statistics by each specified method of collection								
Census	13	9	—	17	9	37	—	—
Frontier control	64	86	25	89	78	34	100	100
Registration at place of employment	3	—	—	—	—	14	—	—
Population register	8	—	—	—	—	33	—	—
Sample survey	4	1	—	—	1	14	—	—
Other	28	3	76	11	25	37	—	—

reporting to the United Nations or reporting that data are not collected. Secondly, using the total population of the reporting countries as a base, it shows the percentage of this population for which each method of collection is used. Each method has been considered separately, so that countries using more than one method are included in more than one category.

34. On the seemingly plausible assumption that no country failing to respond to the Statistical Office special inquiry on international migration statistics does, in fact, collect such information, we find that this collection is undertaken in some portion by countries containing only about half of the world's people. Once again, Africa and, particularly, Asia stand out as non-collectors; in fact, it is only in Asia that such information is collected for less than half the population.

35. The methods of collection vary considerably. Although frontier control is the most widely used, population registers and censuses figure fairly prominently, in Europe at least. The continent with the most widely developed systems of data collection is Europe. It is also in Europe that one finds the most frequent use of more than one method.

Quality of the data

36. The great variations from country to country in the sources of migration statistics and their coverage, in the definition of an international migrant and in the types of information collected on the characteristics of migrants makes it impossible at this time to provide a summary statement of the quality of the national data. These differences become obvious as soon as any attempt is made to use statistics from different countries concurrently. For example, statistics for a given year on emigrants by country of intended residence cannot be equated with those for the same year on immigrants by country of last residence. Although it is impossible to estimate the relative weight of the differences mentioned above and of incomplete coverage as factors in the discrepancies, it appears that data on immigrants are generally more complete than those on emigrants. Historically, countries have been much more interested in information about new arrivals and in control of their entry than they have been in persons leaving. More recently, however, countries of heavy emigration have found that their requirements for information about their emigrants have become much greater and interest in emigration statistics is correspondingly increasing.

CONCLUSION

37. As indicated in the preceding sections of this paper, the official national statistics available to the Statistical Office of the United Nations show that, over the past 25 years, the greatest national improvements, both quantitative and qualitative, have occurred in taking censuses and sample surveys particularly among the developing countries in recent years. It may be hoped, if not yet anticipated, that this trend will continue into future decades. There has been considerably less improvement in the collection of birth and death statistics and notably little with respect to international migration statistics. Consideration must now be given to the work that remains to be accomplished.

38. In the preceding review, data on population size and composition, birth and death statistics and statistics of migration have been treated as discrete entities. In fact, however, they should be considered to be parts of the body of national statistics that can be made available through an integrated programme of data collection. In the demographic field, the programme should include not only the statistics discussed in this paper and refinements of them, but statistics of internal migration. The latter are becoming of increasing concern to Governments, and the possibility of integrating them into the Statistical Office's collection of national statistics is now under consideration.

39. Maximum advantage can accrue from any one source of demographic data only by combined use with data produced by other sources. For example, the value

of census results is enhanced if they can be employed together with the results of other investigations, as in the use of the census data as a base for computing current vital rates and as a statistical frame for sample surveys. The purposes of a continuing programme of data collection can best be served if the relationship between various statistical investigations is considered when planning is under way for any one investigation and if provision is made for facilitating the use of the results of one investigation with those of others

40 This is particularly important in countries where statistical systems are at the early stages of development and advantage must be taken of all possible tools for obtaining the basic data needed for social and economic development planning. With regard to birth and death statistics, for example, the use of sample surveys for providing estimates needed immediately can be combined with the first steps in initiating the development of a nation-wide system of vital registration that can ultimately, together with migration statistics, provide the steady flow of statistics required for the preparation of reliable indexes of population growth during intercensal periods as well as projections of future population growth. As vital registration expands, comparison of the data so gathered with that generated by sample surveys can furnish estimates of the reliability of each of the two sources of information

41. Periodic censuses, to some extent, and *ad hoc* sample surveys, to a greater extent, can make available the information on internal migration essential to the study of past trends in urbanization and successful planning for the future. As statistical development proceeds, consideration can be given to the use of a permanent population register for providing regular data on the internal distribution of the population and its migration For statistical purposes, population registers can also furnish information on other characteristics of the population of small areas of the country, by contrast with national sample surveys that cannot provide detailed small-area data. It must be remembered, however, that, irrespective of its administrative uses, a population register can provide useful statistics only if it is complete and up to date. Countries without an adequate statistical organization have frequently experienced great difficulty with maintaining registers at a satisfactory level of reliability for statistical purposes.[7]

42. Adequate international migration statistics appear to be one of the most difficult goals to achieve in any system of demographic statistics, regardless of the level of statistical development within a country. They are particularly troublesome in countries with readily accessible, unguarded frontiers, especially if the frontiers are frequently crossed by nomadic groups or by persons working in a country adjacent to the one in which they live. Satisfactory standards for international migration statistics still remain to be developed and efforts in this direction will be stressed by the United Nations Statistical Commission in its ongoing work of promoting the development of national statistics and the improvement of their comparability

43 Regardless of the kind of statistics under consideration, a most important responsibility of national statistical authorities in the foreseeable future will be the continuing effort to evaluate the reliability of the information gathered Although the United Nations will continue to provide advice and assistance in this endeavour, evaluation demands the use of all possible national information and resources and can best be accomplished by the persons most familiar with national circumstances It is an essential activity in any country's efforts to develop and improve the data that it needs for its national purposes.

[7] For a discussion of the possibilities of using registers for obtaining statistical information for potential use in demographic, biological, medical, sociological and genetic studies, see *Methodology and Evaluation of Population Registers and Similar Systems* (United Nations publication, Sales No. E 69.XVII 15)

TABLE 7. AVAILABILITY AND SOURCE OF SELECTED FERTILITY STATISTICS: THE WORLD AND EACH CONTINENT

(Percentages computed on 1971 estimated population)

	World	*Africa*	*North America*	*South America*	*Asia*	*Europe*	*Oceania*	*USSR*
Total number of countries in the world	223	57	36	15	46	41	27	1
Total population (000's) in 1971	3 706 249[a]	353 852	326 532	195 310	2 104 148	465 554	[illegible]	[illegible]
Tabulations								
1 Live births (totals)								
Civil registration								
Number of countries	152	21	35	13	[illegible]	[illegible]	21	[illegible]
Population (000's)	1 586 527	115 892	321 207	99 616	[illegible]	[illegible]	17 208	[illegible]
Percentage	43	33	98	51	[illegible]	[illegible]	[illegible]	[illegible]
Sample surveys								
Number of countries	32	24	—	—	[illegible]	—	—	—
Population (000's)	1 250 209	137 772	—	—	[illegible]	—	—	—
Percentage	34	39	—	—	[illegible]	—	—	—

TABLE 7 (*continued*)

	World	*Africa*	*North America*	*South America*	*Asia*	*Europe*	*Oceania*	*USSR*
2. Live births by age of mother								
Civil registration:								
Number of countries	109	8	30	11	10	36	13	1
Population (000's)	1 422 798	63 207	321 105	99 208	213 415	463 881	16 915	245 067
Percentage	38	18	98	51	10	100	86	100
Sample surveys:								
Number of countries	14	10	—	—	4	—	—	—
Population (000's)	350 823	40 425	—	—	310 398	—	—	—
Percentage	9	11	—	—	15	—	—	—
3. Live births by age of mother and sex								
Civil registration:								
Number of countries	50	3	11	2	4	24	6	—
Population (000's)	677 165	8 492	235 905	10 045	108 874	297 943	15 906	—
Percentage	18	2	72	5	5	64	80	—
Sample surveys:								
Number of countries	6	6	—	—	—	—	—	—
Population (000's)	10 118	10 118	—	—	—	—	—	—
Percentage	0	3	—	—	—	—	—	—
4. Live births by age of mother and live-birth order [b]								
Civil registration:								
Number of countries [b]	84	7	22	6	8	32	8	1
Population (000's) [b]	1 266 138	56 077	254 770	63 604	200 163	429 979	16 478	245 067
Percentage [b]	34	16	78	33	10	92	83	—
5. Live births by live birth order [b]								
Civil registration:								
Number of countries [b]	85	7	23	6	8	32	8	1
Population (000's) [b]	1 318 630	56 077	307 262	63 604	200 163	429 979	16 478	245 067
Percentage [b]	36	16	94	33	10	92	83	—
Sample surveys.								
Number of countries [b]	1	1	—	—	—	—	—	—
Population (000's) [b]	1 911	1 911	—	—	—	—	—	—
Percentage [b]	0	1	—	—	—	—	—	—
6. Live births by age of father								
Civil registration:								
Number of countries	46	4	12	5	5	12	8	—
Population (000's)	616 853	54 662	255 891	73 714	44 112	174 843	13 631	—
Percentage	17	15	78	38	2	38	69	—
7. Live births by legitimacy status								
Civil registration:								
Number of countries	105	12	31	11	5	37	9	—
Population (000's)	1 084 908	70 588	309 848	94 437	149 113	444 994	15 928	—
Percentage	29	20	95	48	7	96	81	—
Sample surveys:								
Number of countries	5	5	—	—	—	—	—	—
Population (000's)	28 126	28 126	—	—	—	—	—	—
Percentage	1	8	—	—	—	—	—	—
8. Live births by occupation of father								
Civil registration:								
Number of countries	13	1	1	1	2	6	2	—
Population (000's)	251 950	5 238	3 753	11 126	108 743	107 593	15 677	—
Percentage	7	1	—	6	5	23	79	—
9. Live births by sex								
Civil registration:								
Number of countries	138	16	35	11	20	38	17	1
Population (000's)	1 509 564	76 715	321 207	96 290	287 774	465 536	16 975	245 067
Percentage	41	22	98	49	14	100	86	—
Sample surveys:								
Number of countries	4	4	—	—	—	—	—	—
Population (000's)	8 013	8 013	—	—	—	—	—	—
Percentage	0	2	—	—	—	—	—	—

TABLE 7 (*continued*)

	World	Africa	North America	South America	Asia	Europe	Oceania	USSR
10 Live births by type of birth								
Civil registration								
Number of countries	45	2	9	3	5	22	4	—
Population (000's)	804 989	14 561	296 746	27 425	115 789	334 585	15 883	—
Percentage	22	4	91	14	6	72	80	—
11 Legitimate live births by age of mother								
Civil registration								
Number of countries	75	4	24	6	4	31	6	—
Population (000's)	937 440	20 286	255 010	60 228	146 141	439 970	15 805	—
Percentage	25	6	78	31	7	95	80	—
Sample surveys								
Number of countries	4	4	—	—	—	—	—	—
Population (000's)	25 569	25 569	—	—	—	—	—	—
Percentage	1	7	—	—	—	—	—	—
12. Legitimate live births by age of father								
Civil registration								
Number of countries	55	4	11	3	4	26	7	—
Population (000's)	661 814	20 286	37 349	21 171	146 141	420 944	15 923	—
Percentage	18	6	11	11	7	90	80	—
Sample surveys								
Number of countries	3	3	—	—	—	—	—	—
Population (000's)	6 528	6 528	—	—	—	—	—	—
Percentage	0	2	—	—	—	—	—	—
13 Legitimate live births by duration of married life								
Civil registration								
Number of countries	48	4	5	2	3	29	5	—
Population (000's)	568 112	21 108	2 439	11 168	109 370	408 339	15 688	—
Percentage	15	6	1	6	5	88	79	—
14 Live births (totals) urban and rural residence								
Civil registration								
Number of countries	42	1	9	3	4	21	3	1
Population (000's)	940 003	5 238	302 505	13 560	113 292	244 552	15 789	245 067
Percentage	25	1	93	7	5	53	80	—
Sample surveys								
Number of countries	12	12	—	—	—	—	—	—
Population (000's)	62 979	62 979	—	—	—	—	—	—
Percentage	2	18	—	—	—	—	—	—
15 Live births by age of mother and urban and rural residence								
Civil registration								
Number of countries	20	—	3	—	1	15	1	—
Population (000's)	234 852	—	9 574	—	2 972	222 194	112	—
Percentage	6	—	3	—	0	48	1	—
Sample surveys.								
Number of countries	5	5	—	—	—	—	—	—
Population (000's)	25 799	25 799	—	—	—	—	—	—
Percentage	1	7	—	—	—	—	—	—
16 Gross reproduction rates								
Number of countries[c]	106	20	18	10	22	31	4	1
Population (000's)[c]	2 557 180	118 455	319 972	181 086	1 212 505	463 750	16 345	245 067
Percentage[c]	69	33	98	93	58	100	83	100
17 Net reproduction rates								
Number of countries[c]	66	16	9	4	9	25	2	1
Population (000's)[c]	1 266 124	60 136	236 804	21 710	270 122	416 608	15 677	245 067
Percentage[c]	34	17	73	11	13	89	79	—

SOURCE: United Nations, *Demographic Yearbooks*, 1965-1971 (United Nations publications, Sales Nos E/F 66.XIII 1, E/F 67.XIII 1, E/F 68.XIII 1, E/F.69.XIII 1, E/F.70.XIII 1, E/F.71.XIII 1 and E/F.72.XIII 1).

[a] Adjusted for discrepancies in national data on international immigration and emigration; unadjusted total is 3,710 [illegible]
[b] Data shown in the *Demographic Y*[illegible] countries reporting 100 or more births.
[c] Refers to data for 1960 or [illegible]

TABLE 8. AVAILABILITY AND SOURCE OF SELECTED MORTALITY STATISTICS: THE WORLD AND EACH CONTINENT

(Percentages computed on 1971 estimated population)

	World	*Africa*	*North America*	*South America*	*Asia*	*Europe*	*Oceania*	*USSR*
Total number of countries in the world	223	57	36	15	46	41	27	1
Total population (000's) in 1971	3 706 249 [a]	353 852	326 532	195 310	2 104 148	465 554	19 783	245 067
Tabulations:								
I. General mortality								
1. Deaths (totals)								
Civil registration:								
Number of countries	152	21	35	13	22	39	21	1
Population (000's)	1 586 527	115 892	321 207	99 616	321 986	465 551	17 208	245 067
Percentage	43	33	98	51	15	100	87	100
Sample surveys:								
Number of countries	32	24	—	—	8	—	—	—
Population (000's)	1 250 209	137 772	—	—	1 112 437	—	—	—
Percentage	34	39	—	—	53	—	—	—
2. Deaths by months								
Civil registration:								
Number of countries	118	11	32	9	16	37	12	1
Population (000's)	1 509 573	73 525	320 132	89 023	300 532	464 464	16 830	245 067
Percentage	41	21	98	46	14	100	85	100
Sample surveys:								
Number of countries	1	—	—	—	1	—	—	—
Population (000's)	141 631	—	—	—	141 631	—	—	—
Percentage	4	—	—	—	7	—	—	—
3. Deaths by age and sex								
Civil registration:								
Number of countries	134	15	34	13	17 [b]	38	16	1
Population (000's)	1 524 368	89 253	320 197	99 616	287 826 [b]	465 536	16 873	245 067
Percentage	41	25	98	51	14 [b]	100	85	100
Sample surveys:								
Number of countries	11	9	—	—	2	—	—	—
Population (000's)	208 430	30 251	—	—	178 179	—	—	—
Percentage	6	9	—	—	8	—	—	—
4. Deaths by marital status, age and sex								
Civil registration:								
Number of countries [c]	67	2	12	7	5	34	7	—
Population (000's) [c]	1 038 105	35 334	247 892	81 964	181 679	465 315	15 921	—
Percentage [c]	28	10	79	42	9	100	80	—
5. Male deaths by occupation and age								
Civil registration:								
Number of countries	24	1	4	1	4	11	3	—
Population (000's)	404 897	34 855	14 312	11 126	111 262	217 571	15 771	—
Percentage	11	10	4	6	5	47	80	—
6. Deaths by cause								
Civil registration:								
Number of countries	109	10	31	13	13	34	8	—
Population (000's)	1 193 317	59 818	319 915	99 616	235 677	462 193	16 098	—
Percentage	32	17	98	51	11	99	81	—
7. Deaths by cause and sex								
Civil registration:								
Number of countries	106	10	31	13	12	33	7	—
Population (000's)	1 176 324	59 818	319 915	99 616	234 907	445 970	16 098	—
Percentage	32	17	98	51	11	96	81	—
8. Deaths by cause, age and sex [d]								
Civil registration:								
Number of countries [e]	58	4	12	7	7	26	2	—
Population (000's) [e]	1 013 371	23 830	308 394	91 136	169 890	404 374	15 677	—
Percentage [e]	27	7	94	47	8	87	79	—

TABLE 8 (*continued*)

	World	Africa	North America	South America	Asia	Europe	Oceania	USS
9 Deaths by cause and medical certification								
Civil registration.								
Number of countries	66	1	18	6	7	29	5	—
Population (000's)	612 313	883	93 900	63 968	38 048	412 303	3 211	—
Percentage	17	0	29	33	2	89	16	—
10 Deaths (totals) urban and rural residence								
Civil registration								
Number of countries	36	—	8	3	4	19	2	—
Population (000's)	621 632	—	296 248	30 910	113 292	178 161	3 021	—
Percentage	17	—	91	16	6	38	15	—
Sample surveys								
Number of countries	9	8	—	—	1	—	—	—
Population (000's)	88 004	51 456	—	—	36 548	—	—	—
Percentage	2	15	—	—	2	—	—	—
11 Deaths by age and sex urban and rural residence								
Civil registration								
Number of countries	19	—	1	—	2	14	2	—
Population (000's)	284 291	—	1 557	—	108 743	170 790	3 021	—
Percentage	8	—	0	—	5	37	15	—
Sample surveys								
Number of countries	5	5	—	—	—	—	—	—
Population (000's)	14 319	14 319	—	—	—	—	—	—
Percentage	0	4	—	—	—	—	—	—
12 Deaths by cause, age and sex urban and rural residence								
Civil registration								
Number of countries	8	—	1	—	—	6	1	—
Population (000's)	94 094	—	1 557	—	—	89 628	2 909	—
Percentage	3	—	0	—	—	19	15	—
II. Infant mortality								
1 Infant mortality (totals)								
Civil registration								
Number of countries	141	18	35	13	17	39	18	[illegible]
Population (000's)	1 551 257	93 248	321 207	99 616	309 426	465 551	17 142	245 06
Percentage	42	26	98	51	15	100	87	10
Sample surveys								
Number of countries	25	20	—	—	5	—	—	—
Population (000's)	417 549	106 954	—	—	310 595	—	—	—
Percentage	11	30	—	—	15	—	—	—
2 Infant deaths by months								
Civil registration								
Number of countries	98	6	27	8	11	36	9	
Population (000's)	1 401 941	44 443	316 051	89 024	226 747	464 443	16 166	245 06
Percentage	38	13	97	46	11	100	82	10
3 Infant deaths by age and sex								
Civil registration								
Number of countries	117	12	32	11	12	37	13	—
Population (000's)	1 222 059	83 201	320 971	83 717	251 981	465 515	16 674	—
Percentage	33	24	98	43	12	100	84	—
Sample surveys								
Number of countries	3	3	—	—	—	—	—	—
Population (000's)	6 901	6 901	—	—	—	—	—	—
Percentage	0	2	—	—	—	—	—	—
4 Infant deaths (totals) urban and rural residence								
Civil registration								
Number of countries	8	7	—	—	1	—		—
Population (000's)	85 245	48 697	—	—	36 548			—
Percentage	2	14	—	—	2			

TABLE 8 (*continued*)

	World	Africa	North America	South America	Asia	Europe	Oceania	USSR
5. Infant death by age and sex: urban and rural residence								
Civil registration:								
Number of countries	6	—	1	—	—	4	1	—
Population (000's)	90 689	—	1 557	—	—	89 020	112	—
Percentage	2	—	0	—	—	19	1	—
Sample surveys:								
Number of countries	2	2	—	—	—	—	—	—
Population (000's)	4 990	4 990	—	—	—	—	—	—
Percentage	0	1	—	—	—	—	—	—
III. Life tables								
1. Expectation of life								
At birth								
Number of countries	156	48	27	12	32	30	6	1
Population (000's)	3 612 581	296 407	325 202	195 265	2 067 515	464 162	18 963	245 067
Percentage	97	84	99	99	98	100	96	100
At specified ages								
Number of countries	98	15	24	11	13	30	4	1
Population (000's)	2 319 797	104 135	311 770	192 774	985 502	464 162	16 387	245 067
Percentage	63	29	95	99	47	100	83	100
2. Life table mortality rates at specified ages								
Number of countries	83	11	22	6	11	30	2	1
Population (000's)	2 222 524	77 891	311 494	158 012	950 221	464 162	15 677	245 067
Percentage	60	22	95	81	45	100	79	100
3. Survivors at specified ages								
Number of countries	85	11	23	6	12	30	2	1
Population (000's)	2 224 968	77 891	311 544	158 012	952 615	464 162	15 677	245 067
Percentage	60	22	95	81	45	100	79	100

SOURCE: United Nations, *Demographic Yearbooks*, 1965-1971 (United Nations publications, Sales Nos. E/F.66.XIII.1, E/F.67.XIII.1, E/F.68.XIII.1, E/F.69.XIII.1, E/F.70.XIII.1, E/F.71.XIII.1 and E/F.72.XIII.1).

[a] Adjusted for discrepancies in national data on international immigration and emigration; unadjusted total is 3,710 million.

[b] Including two countries for which tabulation available only for "age".

[c] Including countries which tabulated "marital status by sex" but not age, numbering one country each in Africa, North America, Asia and Europe; two in South America.

[d] Data shown in the *Demographic Yearbook 1966* and *1967* limited to countries having distributions in which the total number of deaths from all causes numbered 1,000 or more, and deaths classified as due to senility and ill-defined or unknown causes (B45) did not exceed 25 per cent of the total.

[e] Including countries for which tabulation available only for medically certified deaths, one country each in North America, South America and Asia.

RESEARCH NEEDED IN THE FIELD OF POPULATION

International Union for the Scientific Study of Population *

1. Any discussion of priorities in demographic research must take account of the purposes to which the results of this research are to be put The interests and priorities of the academic demographer who studies the interrelationships between different demographic variables, or those between demographic variables, on one hand, and social and economic ones, on the other, may well differ from those of the administrator particularly concerned with problems of development or with population programmes, and they may each apply different criteria to the term "needed". The administrator will normally look for results which are capable of immediate application However, research designed to provide a basis for action programmes needs to take account of existing knowledge of demographic interrelations and needs to be firmly based on existing theoretical and empirical generalizations designed to explain population change It would not be possible, unless there was already in existence some basic knowledge of the factors which influence the growth of human populations. The formal links between basic demographic variables, such as fertility, mortality and the age structure, are already well understood. Yet, in demography, as in other branches of knowledge, more basic research may well lead to a clearer understanding of applied problems Therefore, in the absence of adequate systems of census-taking and vital statistics in many areas of the world, methods of dealing with defective data have been devised to permit conclusions to be drawn about the state of demographic development The assumptions underlying these methods are somewhat restrictive and so it is necessary to study the applicability of these methods to situations where the assumptions do not necessarily apply. Such research, involving as it does the use of population models and simulation methods may, at first sight, look entirely theoretical, but may still produce a better pay-off than some studies which would appear, at first sight, to have a more practical significance. These problems are discussed further in paragraph 9.

2. In this paper, an attempt is made to assess the need for demographic research which will make it possible to obtain a clearer assessment of the current demographic scene, to improve methods of forecasting and to suggest ways of influencing population growth. The provision of better routine demographic information is not dealt with. There are still many countries in which there have been few censuses or even none and in which the quality of the basic demographic data is deficient Naturally, better and more adequate provision of basic demographic information for areas in which this is not currently available is welcome and should be accorded a high priority, which implies an improvement in census-taking and the collection of vital statistics, and in co-operation between statisticians and demographers In recent years, opposition to census-taking and the collection of vital statistics has been encountered in several countries, because of a fear of infringing on personal privacy This has led to difficulties in administering these services It is important to understand the reasons which have led to these attitudes and to take steps to counter their effects However, this aspect is not considered to constitute "research" in the sense considered in this paper

3. Any research needed in the biomedical field, such as work dealing with the improvement of contraceptive techniques or the provision of better or safer methods of abortion, has also been excluded These topics are dealt with in the paper provided for the Conference by the World Health Organization (WHO) [1] However, some of the subjects discussed below will impinge on the biological field.

4 A further preliminary point should be mentioned There currently exists a considerable shortage of trained demographic research workers, which means that a number of desirable pieces of research have had to be abandoned, or undertaken by persons who have received their primary training in other disciplines Indeed, it has been stated that even the proper exploitation of material already available in some censuses of certain countries has been held up because of the shortage of skilled staff, capable of analysing, evaluating and appreciating the information presented in official statistics The 1960 round of censuses in the region of the United Nations Economic Commission for Asia and the Far East (ECAFE) has been cited as an example. Any plans for an extension of demographic research must therefore presuppose an expansion in the number of people qualified in demography and thus an extension of training facilities Such facilities should be provided for people at the beginning of their careers, in particular, it is important to make it possible for recent

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[1] World Health Organization, "Research on the biomedical aspects of fertility regulation and on the operational aspects of family planning programmes", *Population Debate*, vol II, part eight.

graduates to be trained in organizations that normally only offer a position on their staffs to people with several years' practical experience.

5. The discussion of needs and priorities can be approached in a number of ways. The conventional subdivisions of demography, such as mortality, nuptiality, fertility and migration, could be considered separately. Alternatively, a distinction could be drawn between research needed in developed and developing countries, for the needs in the two areas are different. Use is made in this paper of both approaches. After a brief survey of the current state of demographic research, there is a discussion of the specific needs of developing countries, where demographers are faced with the need to develop special techniques of observation and analysis. Then there is a discussion of fertility, both in the developed and in the developing areas of the world, including in this topic both nuptiality and research on family planning. Mortality and general problems of health are also examined. Lastly, under the general heading "Relations between population and economic and social development", migration, urbanization, general environmental problems, population structure, population policy and problems of "prediction" are discussed.

A brief survey of the current state of research

6. During the past 10 years, there has been a spectacular increase in general interest in demographic questions. Two factors have contributed to this development:

(*a*) The increase in population, mainly in underdeveloped, but later in developing countries;

(*b*) The need to protect the environment and the risk of exhausting some natural resources.

Priority has thus been given to studies on fertility (and particularly on family planning) and on economic development; and to studies, the results of which could be applied immediately, in preference to more fundamental research.

7. The rapid increase of work in these areas was made possible only by the combined effort of a number of organizations, which also played an important part in the co-ordination of research and in the dissemination of its results. Among these, special mention must be made of the United Nations, which in 1966 set up the United Nations Fund for Population Activities (General Assembly resolution 2211 (XXI)) and declared 1974 to be World Population Year (General Assembly resolution 2683 (XXV)), its Population Division, the regional economic commissions and the specialized agencies of the United Nations (World Health Organization, International Labour Organisation, the Food and Agriculture Organization of the United Nations, United Nations Educational, Scientific and Cultural Organization), the regional population training institutes and the Organisation for Economic Co-operation and Development and such international organizations as the International Union for the Scientific Study of Population, the World Fertility Survey; public and private international foundations in Asia, America and Europe; the International Planned Parenthood Federation and many universities throughout the world.

8. Certain areas of research have been comparatively neglected. It is considered, therefore, that in the coming years demographic research should not develop at the same rate in all subbranches of the subject, but that a redefinition of priorities, as is attempted in this paper, is necessary to fill the gaps that exist.

Data needs in developing countries

9. Reference has already been made to the low quality of demographic information currently available in many parts of the world. Thus, there has been no census or major sample survey in the Sudan or in Zaire since the mid-1950s. No complete census has ever been taken in Ethiopia, though some demographic information has been derived from sample data. This situation cannot be remedied immediately, as it will take time to construct an adequate system of census-taking and vital statistics. The lack of reliable data makes it particularly difficult to estimate mortality patterns after childhood, which, in turn, makes it difficult to estimate the age and sex structure of these populations. Data on orphanhood have been exploited to study adult mortality and other methods of indirect estimation have been constructed. Most of these new techniques are based on the assumption that vital rates have remained constant over time. It is necessary to analyse the robustness of these procedures to variations in the hypothesis of constancy of vital rates. Such an analysis may involve computer simulation of different model populations with varying demographic histories. Such studies would, at first sight, appear to have limited practical value; but given the inevitable delay in improving procedures for taking censuses and administering vital statistics and the urgent need for better information, research designed to improve the quality of estimation methods would seem to warrant a high priority.

10. More experimental work is also necessary in dealing with the accuracy of recording current vital events by different methods, on recall lapse and on the nature of post-enumeration checks. Studies of sampling methods, questionnaire design and survey errors would be included. Survey errors may well be particularly important and are a relatively neglected field of study. Thus, many of the questionnaires used in demographic surveys are composed in a European language, but are administered to respondents in the vernacular, the translation often being left to the field-worker. It is necessary to assess the extent to which accuracy of response is affected by these procedures; for example, it is more important for the translation to render the meaning of the question clearly than to be a literal rendering. Many of these problems are statistical and managerial in character and do not fall within the area

of demography proper. Study is none the less crucial for the advancement of demographic knowledge. Not all this information is currently published Systematic evaluations and international comparability would be desirable and the work of the World Fertility Survey [2] may help to illumine this area.

11. Two methods of investigation have been tried in recent years in less developed countries first, the method of matching data from two independent sources; and, secondly, multiphase inquiries. There have been some disagreements about the relative advantages and disadvantages of these two methods. Cost-benefit studies of these and investigation of the circumstances in which each method is particularly appropriate would be useful.

MORTALITY

12. Reference has already been made to the absence of information on mortality patterns, particularly in

little better in some other developing areas. Knowledge on age-specific rates of mortality is scanty and information about causes of death virtually non-existent. It will be necessary to obtain such information from special *ad hoc* sample surveys Studies of the differential mortality of the sexes, particularly in those areas in which female mortality apparently exceeds that of men, should be undertaken in order to isolate the factors that lead to an inversion of the usual sex differential. In this connexion, special attention should be paid to the ... that resulting from ... well as to differ-

13. The need for improvement in the method of making estimates has already been commented on in paragraph 9, in addition, there is a strong case for the construction of a new series of model life-tables to replace those of the United Nations constructed some 15 years ago [3] While these tables have proved valuable as a pioneering effort, they were mainly one-parameter tables. The construction of more sophisticated model tables applicable to developing countries woud be of great help in the study of mortality. Some work has been done in this field, particularly the construction of ... tables But all are

patterns.

14. It is also important to monitor the change in death rates in developing countries over time. Mortality rates are used, *inter alia*, in population projections an in those areas of the world where mortality is still higl Variations in the assumptions made about the future c mortality may significantly affect estimates of futur population. In this connexion, a careful study of th experience of developed areas in which mortality declin at certain ages appears to have come to a halt ma provide an important pointer to a better understandin of the situation in the less developed areas of the world

15 Mortality is often studied not only for its ow sake, but as an indicator of the standard of health which population enjoys However, there is still insufficien information on the connexion that exists between sani tary conditions and mortality rates For instance, th

be paid to the apparent cessation of the fall in mortality among middle-aged men

veloped There are still gaps, however, particularl referring to the mortality at either end of life. Socia differences in infant and peri-natal mortality (and eve in adult mortality) have persisted in many develope areas, even though the absolute level of the rates ha fallen Further research is required to try and isolate th conditions that are associated with those death rate which are above the average.

17 The number of very old people (aged 80 an over) in developed areas is likely to increase for th remainder of this century This will lead to increase requirements for social and medical services for thi segment of the population Death rates of the very ol have responded less to changing social and economi conditions than have death rates at earlier periods o life. Even in countries with good vital registratio systems the death rates of the very old have often to b obtained by estimation. Further study of their mor tality—the changes with age, cause patterns, the ex treme span of human life and the problem of "medicate survival"—will have to be given more attention tha they have received so far.

18. Statistics on causes of death have been publishe in many countries, but have not always been full analysed. A study of the interdependence of differen ... the construction of a typology of mortalit

FERTILITY

19. One of the important objectives of demographi research is the improvement of methods of populatio projection and prediction. To achieve this, furthe studies on fecundity and fertility, both in developed an in developing countries, are of fundamental importance

[2] An international programme of fertility research undertaken, with the collaboration of the United Nations, by the International Statistical Institute, Voorburg, Netherlands, in co-operation with the International Union for the Scientific Study of Population, Liège, Belgium

[3] *Age and Sex Patterns of Mortality Model Life-Tables for Under-developed Countries* (United Nations publication, Sales No. 1955.XIII 9).

and they would yield more immediate returns than studies on mortality. In developed areas, mortality has fallen to a very low level and variations in assumptions about future mortality are only likely to affect the older population; in developing areas, though mortality is higher, fertility is by far the more important factor liable to affect future population movements.

20. As concerns measurement, the area which is least developed is that of fecundity, rather than fertility. Relatively little work has so far been done on differences in the biological capacity to conceive and reproduce both between different populations and between different strata of the same population. It is not known whether there are any ethnic differences in fecundity. Studies on the natural fertility of different populations would fill this gap and would also be a prerequisite of the assessment of the effectiveness of different contraceptive programmes.

21. However, in developed countries, studies of the biological capacity to conceive and reproduce are less important than studies of actual reproductive performance. Research in this area can be done both at the macro and the micro level. In the former case, it is necessary to achieve a clearer understanding of the social and economic variables that are associated with fertility differences. Comparative and cross-cultural studies are important in this connexion, and it is to be hoped that the material gathered in the World Fertility Survey will provide new insights. Factors that should be taken into account are different levels of education, indexes of economic development, the changing position of women and different types of kinship and family structure. All these factors should be studied at different stages of development. A good deal of work along these lines is already in progress, and the demographic journals are full of papers reporting the outcome of different investigations. There has not, however, been much co-ordination of effort in this field so that the results of different studies cannot always be compared with one another. Closer co-operation between different national research organizations might pay dividends in this area.

22. In this field, too, some studies that at first sight appear academic may contribute to a better understanding of the demographic transition. The detailed historical studies of European countries recently undertaken, where the statistics of small areas within national aggregates have been carefully examined, are a case in point. More generally, the history of population may be considered to be a laboratory in which a number of experiments have been made which can be analysed with profit. The observation of present-day developments (which is easier and deals with events which are better known) is of greater interest and could be greatly improved by closer international co-operation. The study of certain populations or subpopulations with deviant fertility patterns or fertility behaviour should also not be neglected.

23. Studies at the macro level will also include work on the association between urbanization and fertility. Historically, the movement to the towns in developed countries has led to lower fertility in these areas and to the emergence of rural-urban differentials. The process of urbanization in developing countries has not always produced similar differentials. Thus, it is important to consider the development of urban fertility in the developing world.

24. One of the areas that have been relatively neglected in macro studies is the subject of nuptiality. The dynamics of nuptiality are still only imperfectly understood and a study of the factors that influence the formation and dissolution not only of legal marriages, but of sexual unions in general, would repay investigation. In particular, a study of the relation between economic variables and nuptiality in different countries and culture needs to be undertaken, and the relationship between nuptiality and fertility needs to be examined.

25. While work at the macro level can throw light on the empirical associations existing between demographic phenomena, on the one hand, and socio-economic variables, on the other, it is at the micro level that most remains to be done. National fertility is the result of an aggregation of a large number of individual decisions, and it is only through a process of disaggregation and a study of individual couples that fertility differences both between and within countries can be properly understood and appreciated. In addition to comparative studies, increasing importance will have to be given to longitudinal studies, in which the demographic events in the life cycle of an individual can be investigated in detail and the influence of "disturbing" factors, such as changes in employment, migration and unemployment, assessed. Such studies will also make it possible to relate changes in attitude to changes in demographic behaviour. Such studies, provided they are carefully planned and carried out, can yield extremely valuable information, even when samples are as small as a few thousand. Indeed, the need for careful administration is itself an argument for keeping the sample small.

26. It is necessary to obtain information on the actual process of fertility decision-making. Hitherto, most studies in this field have concentrated on the attitudes of women towards family-building and fertility. There have been relatively few studies dealing with the attitudes of men. It is, however, doubtful whether even in developed countries, where family planning is widely practised and the emancipation of women has made most progress, all fertility decisions are made by women rather than by the couple jointly. In those parts of the world where women still occupy a subordinate position, the attitudes and motivations of men may be more important than those of women and this relatively neglected area should receive greater attention.

27. The nature of decisions on family size also requires further study. So far, many studies have con-

centrated on the investigation of preferred and expected total family sizes. Yet, attitudes towards fertility almost certainly change in the process of family formation, and it would seem preferable to study attitudes at different stages of family-building, i.e., whether a couple with n living children should continue to have a child of order $n + 1$. The sex distribution of present families would have to be considered in this connexion. In this area, collaboration between demographers and social anthropologists may be valuable, particularly if cross-cultural studies are to be undertaken. It is also hoped that the World Fertility Survey might undertake studies in this area.

28. Studies of individual decision-making at the micro level are difficult to carry out and demand considerable organization, including the recruitment of a force of suitable interviewers. They are also subject to the uncertainties and difficulties of all attitude surveys Moreover, their format and questionnaires cannot be standardized for the world as a whole, as account will have to be taken of different social and economic circumstances in different areas. Even though a limited degree of standardization and co-ordination is desirable, this is not the most important consideration; they provide the only way of obtaining a clearer understanding of certain concepts (ideal number of children, unwanted pregnancy) in different cultures and of finding new indicators of fertility behaviour

29. Attention should be given to the general pattern of relationships within the individual family and the influence on fertility decisions. More research in the sociology of the family would provide a better under- [illegible] values from generation to generation in different societies.

FAMILY PLANNING AND EVALUATION OF FAMILY-PLANNING PROGRAMMES

30. Reference has already been made to the desirability of improving the study of fecundity (see para. 19). Improved methods are necessary to assess the efficiency of different types of contraception in averting births that would otherwise have taken place in the absence of these devices. The concept of "averted births" also needs further investigations.

31 The continuation of what have become known as KAP (knowledge-attitude-practice) studies of contraception is desirable. Attention should be paid to ensuring greater comparability of surveys. Studies need to be undertaken to investigate the best methods of disseminating information on contraception and on motivating couples to make use of contraception devices and of the services that are available to them These studies should be linked with the work on individual and familial decision-making described above (paras. 27-29)

32. Further studies are desirable to establish th ways in which public policies may influence the rate of population change. Such studies will necessarily hav to be linked with the investigations on individual mo tivations which have already been mentioned. Howeve additional work should be done on the administrativ problems involved in the execution of populatio policies and of the impact that such measures are like to have on general economic policy and on the soci services, e.g , the liberalization of abortion laws on th availability of general gynaecological services. If r duced fertility were to be encouraged by fiscal measure attention would have to be given to devising schem that would discourage fertility, while not penalizin children already born. The social and distribution effects of fiscal measures adopted for demograph reasons (whether pro- or anti-natalist) must not b overlooked

GENERAL RELATIONSHIP BETWEEN POPULATION AN ECONOMIC AND SOCIAL DEVELOPMENT

33. The beginning of economic growth (particularl when linked with industrial development) normall brings with it a change in the geographical distributio of the population. People move either to new centr of attraction (when new industries or new towns a founded), or, more frequently, to towns which alread exist. In urban areas, migration, both internal an international, is a much more important determina of population growth than natural increase. It is a important factor in urbanization. Methods of analysin this process need to be improved through better defin tions of urban agglomerations, the subdivision of the areas into more homogeneous zones, the study of are of high concentration and careful observation of th growth of new towns. Historical studies of urban grow also provide a means of increasing knowledge

34. Much more work needs to be done on motiv tions for and conditions of migration, both to larg towns and elsewhere. Reasons for leaving place o origin, choice of the time of emigration (particularly i relation to the life cycle of the family), the choice o the place of destination, the role of housing and th effect of measures of physical planning can only b understood by the careful analysis of available da (obtained through census enumerations and oth means) and by *ad hoc* surveys The integration o migrants at their place of destination and consequenc for the place of origin must equally be studie Seasonal migrations and commuting must not b neglected either; commuting, in particular, entails soci costs and has important repercussions on the tim budget of individuals.

35. [illegible] problems, specific to international migration. There i in the first place, the problem of its measuremen Information is often scantier and less accurate than fo

internal migration; frequently, information on immigrants is lacking and information on emigrants almost non-existent. The demographer is faced with a problem similar to that involved in estimating the natural increase in population in a country without a system of vital statistics. A special methodology is necessary, and so far very little work has been done on this subject. The effect of migration on the age structures of the countries of immigration and emigration is not negligible. Further, the effect of migration on birth rates of sending and receiving countries needs to be given greater attention. Attention needs to be given to problems of assimilation and integration of immigrants in receiving countries, particularly where wide cultural differences exist between the immigrants and the native population. There is need to obtain information on the success of measures taken to avoid discrimination and to reduce the possibility of conflict between different immigrant groups and between immigrants and natives. In the case of temporary migration, very little is known about the length of stay of temporary migrants, the conditions of return migration and the consequences of temporary migration in the migrants' countries of origin.

36. Economists have recently given more attention to the demographic factor in economic development than in the past. There is, however, a need to use more refined demographic measures in the study of economic development and to increase the number of demographic parameters in the model. Attention should be given to the economic consequences of slower population growth, and, in the developed countries, to the possible consequences of a decline in total numbers or of fluctuations of population size. These will affect population structure, and, though the effects may be slow to become apparent, they will be difficult to reverse. A sudden change in the birth rate may have more immediate and important consequences; several countries have experienced such changes in recent years. More generally, the speed of achieving a given demographic objective may lead to disturbances in population structure which may be long-lasting.

37. The economist as well as the demographer is interested in the study of the labour force; the latter tends to stress the influence of demographic structures and their development. It is important to realize that labour is not a homogeneous factor of production and that men can neither be easily substituted for one another nor transferred from place to place without difficulty. In other words, a system of manpower accounting (in which different levels of skill and training are distinguished) is needed as a supplement to purely financial accounts. Clearly, problems of education and training cannot be considered solely in financial terms. Special attention will need to be given to problems of female education and of women in gainful employment and their relation to fertility and the composition of the working population.

38. During the past few years, there has been an upsurge of interest and considerable expansion in studies dealing with the relation between population resources and the environment. Such discussions have too frequently been in global terms and demographic variables have been treated in them in a somewhat simplistic fashion. Much more work is necessary for a better understanding of the relationships used in these models, for instance, relationships between mortality and pollution and degradation of the environment, the consequences of famines and malnutrition on fertility and mortality, the consequences of very high population densities on stress etc. Research in these fields should be encouraged.

39. Interrelations between population, resources and environment can only be studied from a long-term point of view. There is another aspect of population studies which requires a long time-horizon, namely, population genetics. This discipline, which at first sight appears abstract and theoretical, is relevant to the study of marriage systems, fertility control, morbidity and migration. It is therefore desirable to support research in this area and to encourage collaboration between demographers and geneticists.

40. One must also mention the necessity of studying the effects of population policies. The first problem in this field is to specify the objectives. In the case of fertility, it is frequently explicitly stated that policies are designed to influence fertility movement in a particular direction. The difficulty of evaluating the effect of family-planning programmes has already been mentioned (see para. 32). However, population policies can apply to a much wider field: mortality and morbidity (public health), internal migration (physical planning), external migration (border controls), nuptiality (family policy) etc. It would be useful merely to list the areas in which attempts have been made to influence demographic variables, directly or indirectly, through voluntary means or by compulsion. Retrospective studies and the observations of current population movements can serve as a substitute for the experiments, which it is impossible to perform in the human sciences. Thus, it is particularly important that the experience of these developing areas in which the rate of growth has recently been reduced should be carefully monitored and the circumstances which led to a decline in growth rates studied.

41. Lastly, if demographers are to assist in evaluating the effects of political decisions and to forecast their consequences, the first task is to improve the accuracy of demographic prediction. The term "prediction" is used deliberately to mean fully specified techniques for extrapolating trends forward with the aim of estimating future values as accurately as possible. Research should be directed towards determining the main features of change over time of the relevant demographic variables and establishing a verifiable theory of the components and determinants of population change. It is against this criterion that proposals for research should be judged and priorities allocated.

TRAINING IN THE FIELD OF POPULATION

Nora Federici *

1. There is by now a widely recognized need for specialists in the field of demography to encourage scientific progress in the knowledge of population problems and to guarantee a correct approach to and a valid control over population policy programmes

2. The characteristic features of the current stage of demographic development vary from one country to another However, almost everywhere they give rise to concrete problems, both immediate and long term, which require proper action. The advisability and forms of such action must be established at national and international levels on the basis of as complete and correct knowledge as possible of the situation and the trends that appear in it or may be expected to appear in the future. The analysis of trends in the quantitative development of the population and of the implications arising from the modifications that may or may not occur in growth rates, the study of the patterns and trends of internal and international population movements, the study of the qualitative and quantitative ways in which urbanization takes place and the evaluation of its demographic and non-demographic consequences: *such are the aspects of the general population problem* which require the professional experience of the demographer to be approached and examined correctly and for which scientific evaluation of results by the demographer is indispensable in order to derive conclusions which are also valid from an operative point of view.

3. Every political action will encounter the success its sponsors hope it to have only if the subjects at which it is directed are able to understand its significance and value and therefore to show themselves prepared to participate in it It is neither possible nor desirable for the enactment of population policies to be guaranteed by measures either formally or substantially coercive which would be contrary to the general principles of human rights Political and administrative institutions must, therefore, have sufficient knowledge of demographic problems and of their interrelations with the different aspects of social and economic development. Furthermore, the population must be adequately informed on the demographic trends current in one particular country and on their implications, so as to be able to participate responsibly in the political choices that are made. The information on and dissemination of demographic knowledge must also be the demographer's task

4 An increasing number of professional demographers will therefore be necessary to fill three equally important roles, research, policy action, information and dissemination of knowledge

5 The study of population trends and the setting-up of population policy programmes requires the collaboration of experts from various branches: demographers must work with ecologists, health experts, economists, regional scientists, town planners etc according to the particular problems which arise In fact, it can be said that the fundamental characteristic of studies and programmes in the population field is precisely the fact that they require multidisciplinary contributions

6 The contribution of professional demographers in research, policy action and dissemination of knowledge will obviously vary from time to time—both qualitatively and quantitatively—according to the situations and according to their different functions, which it is well to examine separately [1]

Improvement of demographic data

7. A preliminary condition for demographic analysis is the availability of data concerning population size and structure, territorial distribution and dynamic characteristics (natural movements and migratory movements, both internal and external).

8 It is a well-known fact that both surveys that supply data on static aspects (censuses and sample surveys) and still more those enabling one to follow demographic natural and migratory dynamics (recording of population movements) are not carried out always and everywhere or do not supply sufficiently reliable data, or otherwise present deficiencies of various kinds

9. In many developing countries, censuses are not carried out at all. In some, sample surveys or other forms of surveying which might make up for the lack of traditional censuses have not even been attempted so far In the developed countries, censuses are generally carried out regularly; but the traditional surveying

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[1] For a discussion of the different roles of demographers see M Macura, "Present and future roles of demographers" and M B Concepcion, "The role of the demographer in the dissemination of demographic information in the [illegible] countries", both in International [illegible] for Study of Population (IUSSP) [illegible] *[illegible]ference, 1973* (Liège, 197[illegible]) [illegible] 142, respectively

method has by now proved inadequate and/or at least insufficient to bring to light certain evidence related, for example, to the changes which have taken place in urban settlements or to the higher territorial and vocational and social mobility of the population.

10. Where there are no surveys giving the size, structure and territorial distribution of the population, the demographer will have the task of setting up a survey (complete or sample) such as to supply these basic data, studying both contents and techniques of data collection, in relation to the objective difficulties present in each country. The demographer will also have the task of training the personnel who are to carry out the survey and of organizing the screening, tabulation and presentation of results.

11. Alongside demographers whom one may call "administrative" in that they are functionaries of the national statistical bureaux, it will be necessary to use the contribution of demographers generally involved in basic and applied research as consultants to the central and peripheral statistical organizations. Their function will be to make suggestions for the updating of the census contents and to propose or organize specific surveys (coupled with the census itself or independent: in certain cases, sample surveys or territorially limited surveys) in such a way as to guarantee that the demographic survey may identify those qualitative changes which social reality brings about and which constitute a basic element of knowledge for politicians and for economic and social planners.

12. The presence of demographers is also necessary in the organizations responsible for the surveying of population movements. Here again, needs vary between developing countries and economically advanced countries. In the former, such surveys are either totally lacking or otherwise unreliable. Once again, the demographer's task will not necessarily be that of organizing such surveys on the basis of models tested in developed countries, but of studying the way in which to collect data on fertility, mortality and migration using suitable sources, in the first place, periodical surveys repeated at very short intervals (either sample or general), according to the different situations.

13. In economically advanced countries where the existence of a central and peripheral statistical organization makes it possible—although with varying degrees of reliability—to carry out compulsory and continuous recording of demographic events, the role of the demographer is, once again, of two kinds: he will act, first, as functionary to registering bureaux to ensure the best possible organization of the statistical services, and to carry out the screening and presentation of data; secondly, as a scholar, to encourage modifications in the acquisition of data so as to ensure their increasing adequacy for the purposes of knowledge and research in the field of demographic trends.

14. The short-comings of traditional surveys—both on the state and on the movements of the population—are becoming increasingly serious and frequent. Often they are unsuited for supplying basic material for the study of differential demographic behaviour patterns. Furthermore, they are unsuited for the cohort analyses which are most useful for the purpose of identifying any changes in these patterns. This fact urgently calls for a radical rethinking of demographic surveying criteria, methods and contents. This process must be the result of collaboration between scholars and those operating in the social field. It is the demographer, however, who must be responsible for the proper approach to any demographic data collection and who must guarantee its completeness.

15. This need to improve demographic data calls for the administrative demographer-statistician. At the same time, the contribution of the demographer will be required as a scholar specialized in demographic problems.

Study of interrelationships between population and economic and social factors

16. It is now generally recognized by scholars that demographic growth, economic development and social changes are to be considered dialectically related. This relationship is to be analysed in the effort to identify and, as far as possible, to quantify the mutual relationships which condition these three aspects of over-all development.

17. As the basic statistical material has accumulated and technological progress has made available increasingly powerful instruments of analysis, such as computers, demographers, sociologists and economists have intensified their efforts along the above-mentioned lines. However, as in other scientific fields, technical progress and the availability of basic material have not so much led to the solution of problems once approached at a purely theoretical level or through rough empirical analyses, but have, rather, clearly brought to light all their complexity and given rise to new questions. This has also proved that to carry out further research in greater depth more complete documentation and the recourse to many different and more sophisticated methods will be necessary.

18. Yet, the need for an advance in basic research is making itself increasingly felt, not only as a scientific need in itself, but as an indispensable instrument for applied research and for the identification of policies. For example, a qualitative change in demographic forecasts and, therefore, progress in their reliability will be possible only once satisfactory knowledge has been reached of the effects which certain variations in economic and social conditions bring about in relation to demographic phenomena. The reverse is equally true.

19. In basic research designed to identify and analyse the complex interrelations between the components of growth, the result of which will be increasingly satisfactory the more it makes use of interdisciplinary contributions, the demographer's task will be to contribute his specific knowledge by taking part in interdisciplinary research teams and directly studying

the problems himself when his basic training enables him to do so.

20 In view of the latter function, it is indispensable for demographers to receive a sufficiently broad basic training, such as to enable them to set these problems into their proper context, although their specialization will continue to be a demographic one. In other words, it is a matter not only of supplying economists and sociologists with a general knowledge of demography, but of producing demographers with specific technical training and at the same time with the broadest possible basic economic and social knowledge

Use of population data in economic and social planning

21. The knowledge of the reciprocal influence of demographic phenomena and economic and social characteristics should constitute the necessary premise for a type of economic and social planning in which objectives for the various sectors are established in such a way as to be mutually compatible and as reliable as possible in their results.

22. The presence and collaboration of the professional demographer is called for in this field as well He will have the task of making forecasts on the future population size and structure and also of carrying out structural analyses of demographic phenomena (and, in particular, of identifying behaviour patterns according to age), without which the attempt to set the fundamental variables into a general model cannot bring any concrete contribution to the problems of national planning Furthermore, the demographer will evaluate the compatibility of certain demographic targets with economic and social objectives or—if one prefers—the compatibility of certain economic and social objectives with demographic targets.

23. The contribution of the demographer is also particularly important in the more specific case of urban and territorial planning (urban systems, metropolitan areas) currently being implemented in the majority of the developed countries. Regional science tends to consider the population purely as an over-all parameter, without taking into account—once again—its structural characteristics, but the latter are decisive for judging the degree of autonomy of the territorial areas and for evaluating the action required in order to maintain this autonomy.

Development of population policies and programmes

24 Both in industrialized and in developing countries, many Governments have already set up or are about to set up population policy and programmes both general and in specific fields, such as family planning

25. These programmes should be of primary concern *for all Governments—obviously in different forms* and with different contents. It is to be hoped that political action in the demographic field will become a generalized fact, because in the context of economic and social policy, population policy represents an indispensable instrument for achieving the objectives established in the plans for development.

26 These programmes can concern different aspects. the purpose of some is to fight disease and to protect health, that of others to modify fertility levels (generally to reduce them, but in some cases to increase them), while that of still others is to regulate migration both inside and outside national boundaries.

27. In setting up programmes for the reduction of mortality and the protection of health, the demographer will act as collaborator. In these cases, the greatest responsibility would, of course, be that of health experts (medical doctors, hygienists) and ecologists

28 With respect to the programmes concerning the regulation of migratory movements, the demographer's task will also be one of collaboration These programmes are, in any case, related to economic evaluations concerning the labour market (national and subnational) and depend upon requirements of a political order (for international movements) and upon urbanistic considerations (in the case of internal movements and, in particular, of urbanization)

29 In programmes concerning family planning and fertility objectives, the demographer's function will be fundamental and both of a scientific and of a technical kind He will define the general lines of these programmes, evaluate their implementation and effectiveness, and eventually see to their correction on the basis of the results achieved Analysis of results obtained should be accompanied by field surveys to test modifications in procreative behaviour These complex tasks can only be entrusted to the professional demographer, with a particular experience in field-work, eventually assisted by a social psychologist and by a medical doctor.

30. For the functions he is to carry out in the field of population policy, the demographer needs specialist training oriented, according to necessity, towards ecobiomedical or socio-economic sciences.

The dissemination of demographic knowledge

31 Paragraphs 1-4 illustrate the need for information on population problems In this context, a further specific function of the demographer is to be considered, which can be divided into two different tasks. The demographer will act as expert and consultant with the task of illustrating and interpreting, for the benefit of political authorities, the changing patterns of demographic development. The demographer must also supply the population with elements of knowledge on demographic problems, both as a teacher in schools of various levels and as an expert in the preparation of texts, newspaper articles, radio and television broadcasts etc.

32. The different functions illustrated in the previous paragraphs suggest the n supp ographers with a type of training ed, vel and in contents.

33. There will be an obvious need for technical and professional qualifications of high and middle level. In particular, the demographer with a middle-level training will be employed for technical tasks in surveying and analysing demographic data. The demographer with a high-level training will act as research worker, consultant and teacher.

34. As concerns the different specializations, it is advisable that specific qualifications in the field of demographic analysis should be integrated by sufficient knowledge in the field of socio-economic studies or eco-biomedical studies. These two possible different approaches will make collaboration between demographers and specialists of these two different branches far more effective, according to the various functions demographers will be called upon to carry out as research workers or consultants in political activities.

Activities of the United Nations and its agencies in promoting basic training in population

35. For some 20 years, the United Nations has fulfilled a notable function in the field of demographic training, through numerous forms of activity. United Nations action in this field is carried out either directly or through United Nations agencies. [2]

Experience of the United Nations— regional training institutes

36. The United Nations currently sponsors five regional institutes in demographic training to meet the demands of developing countries.

37. The centres generally accomplish various tasks: assistance to local scientific institutions (universities and research institutes); publication of didactic and technical texts; direct didactic activity (courses in demographic training, both specific and interdisciplinary). Courses held directly by the centres cater for students from countries in that area; for the most part, they are appointed by the Governments of those same countries which will later use them for professional purposes.

38. The United Nations provides these centres with scientific and technical staff, in addition to the national experts, books and other didactic material and various equipment.

Latin American Demographic Centre

39. The head office of the Latin American Demographic Centre (CELADE) is at Santiago, Chile, with a branch at San José, Costa Rica; it came into operation in 1958.

40. Demographic training activities have been and are still being arranged in three main streams: training through specialized courses held directly by the Centre; collaboration with the national scientific institutes for the teaching of demography in these institutes; publication of manuals and scientific-technical works.

41. The specialized courses organized directly by CELADE are of two types: a one-year first-grade course and a one-year second-grade course. Since 1972, the first-grade course has been held at San José and the second-grade one at Santiago; both courses are expected to be transferred to San José in 1974. Since 1963, there has also been a training course (third grade) in operation for internal and affiliated students in the Research Centre (created in 1961), the aim of which is to train experienced officials in national institutes for demographic research.

42. CELADE is currently organizing a higher grade specialized course for Latin American university graduates in economics, social sciences, medicine, engineering and exact sciences. This course should provide, over and above a solid grounding in demographic theories and techniques, a general interdisciplinary background to the correct understanding of demographic phenomena in their economic and social context, with the aim of producing professional demographers capable of fulfilling didactic, scientific and advisory functions.

43. Technical assistance provided by CELADE to the national institutes constitutes the other basic aspect of its training activity. This is carried into effect with the collaboration of CELADE experts in the regular courses provided in the teaching programmes of the various national universities in Argentina, Brazil, Costa Rica, Cuba and Venezuela, and in the training programmes organized by regional and national institutes.

44. The editorial capacity of CELADE has been carried out in the past and is still being carried out with the publication of numerous texts, suitably arranged or translated into Spanish; this activity is currently in the full course of development. [3]

International Institute for Population Studies

45. Established in 1956 as a centre for demographic training and research through an agreement between the United Nations and the Government of India, the International Institute for Population Studies (IIPS) has its base at Bombay. It constitutes both a national and a regional institution (for the region covered by the United Nations Economic Commission for Asia and the Far East (ECAFE)) for teaching and research in the field of population studies; and its aim is to provide training for demographic specialists, from every country

[2] A synthesis of demographic training activity carried out directly by the United Nations may be found in United Nations, Population Division Note to the Administrative Committee on Co-ordination, Subcommittee on Population, "United Nations activities in training in the field of population", dated December 1972.

[3] For a more ample illustration of the training activity of the Latin American Demographic Centre, and an analytical indication of the course programmes, see G. Macció, "The teaching of demography at CELADE", in International Union for the Scientific Study of Population (IUSSP), Committee on Teaching of Demography and Training in Population, Working papers, pp. 331-362. Hereafter referred to as IUSSP, Committee ... Working papers.

in the region, who would be capable of programming and carrying out scientific and didactic activities in the field of population.

46 The didactic function of the centre came into operation in 1957; it is carried into effect with a scheme which includes a one-year "certificate" course and a two-year "diploma" course.

47. The Institute is recognized by the University of Bombay in respect of students preparing for the doctoral degree in demography and similar disciplines. Occasionally, IIPS runs short courses to meet the possible needs of special groups of students. The programmes of the courses are modified to keep up with both scientific advances in demography and changes in the needs of specialists in particular sectors. [4]

48. The assistance provided to the Institute by the United Nations consists of providing experts and equipment, and offering fellowships to non-Indian students; fellowships are awarded to Indian students by the Government of India.

Cairo Demographic Centre

49. The Cairo Demographic Centre (CDC) was established in 1963, following an agreement between the United Nations and the Government of Egypt The Centre was originally set up as a regional centre for the African continent (the region covered by the United Nations Economic Commission for Africa (ECA)); but in 1968, its status was changed and it became an inter-regional centre since it, in effect, embraced, both in the field of research and in the field of professional training, all the Arabic-speaking countries, both African and non-African, in addition to a certain number of non-Arab African countries. Some 25 countries were served by the Centre in 1973. [5]

50. The training activity of CDC is, as is the case of the other centres, carried out on two levels: a basic one-year "diploma" course and a further, second-grade, one-year "special diploma" course.

51. The Centre has also organized seminars and courses for research workers in which graduates, students and other experts have taken part. The CDC has recently also devised a Master's degree programme both for second-grade graduates and for those first-grade graduates who have carried out further population studies recognized by the Centre; the first two enrolments were made in 1973.

52. A subsidiary activity of CDC is the translation of demographic texts into Arabic so as to render them accessible to Arabic-speaking students from universities and national institutes. [6]

Regional Institute for Population Studies, Accra

53. The Regional Institute for Population Studies (RIPS) was established in December 1971, following an agreement between the United Nations and the Government of Ghana, with the aim of providing for the needs of demographic training and research for English-speaking African countries. In accordance with the agreement, the United Nations bears the responsibility for a great part of the teaching staff, the equipment and fellowships for 25 trainees. The Government of Ghana is responsible for the rest of the staff, premises and accommodation The Institute is situated on the Ghana University campus, near Accra, the programmes and academic qualifications are analogous to those of the aforesaid university

54. In 1972, RIPS began its activity Two courses are held there, both one-year courses: the first offers a specialized post-graduate diploma; and the second is a Master's degree course open to graduates of the Institute or to students at an equivalent level.

55. Specific and practical training courses are also forecast

56 The RIPS also proposes research development, advice for countries in the region and the editing of publications, among which would be a quarterly newsletter. [7]

Demographic Training and Research Institute, Yaoundé

57 The Demographic Training and Research Institute (IFORD) was established at Yaoundé in November 1971, following an agreement between the United Nations and the Government of Cameroon, and began its activity in 1972. It proposes to provide for the demographic training of students from the 22 French-speaking African countries, [8] to organize and direct basic and applied research relative to the demography of the interested countries, and to provide documentation and advice in demographic matters to the same countries.

58. The length of the courses held at the Institute is from one to three years, with the first year being devoted for the most part to general training and the two following years to specialization and the practice

[4] For the evolution of the programmes and their current [illegible]

Zambia

[illegible] working papers, pp [illegible].

[7] For further information and for course programmes, see [illegible]

Zaire.

of research or statistical-administrative functions. Admitted to the courses are students with a diploma in statistics (*Ingénieur des travaux statistiques*), or in geography, economy, biology, mathematics, or physics; admission is competitive. [9]

59. A complete table of the training activities of the various centres is as follows:

Centre	*First-grade diplomas*	*Second-grade diplomas*	*Specialization*	*Other training activities*
Latin American Demographic Centre (1957-1972)	261	92	19	15
International Institute for Population Studies (1957-1971)	298	64	5	8
Cairo Demographic Centre (1963-1972)	217	35	—	11
Regional Institute for Population Studies, Accra (1972)	10	15	—	—
Demographic Training and Research Institute, Yaoundé (1972)	10			

60. Table 1 contains the distribution of students who have followed courses, in accordance with their country of residence.

Experience of the United Nations: other activities

61. Demographic training is sustained by the United Nations, above all through the granting of fellowships which, among other things, allows many young people to attend courses held both at the Centres and at national institutions.

62. Between June 1970 (the beginning of the fellowships programme) and the end of 1972, a total of 207 fellowships were awarded: of these, 89 were for training in the field of population statistics, 78 in the field of family planning and 38 for the study of formal demography, divided regionally as follows:

	Field of study				
Region	*Population statistics*	*Demography*	*Family planning*	*Others*	*Total*
Africa	21	13	22	—	56
Asia and the Far East	49	13	48	—	110
Latin America	7	8	3	—	18
Western Asia	7	2	1	2	12
Europe	5	2	4	—	11
Total	89	38	78	2	207

63. In future years, 350 annual fellowships are expected for students following special courses and specialized courses.

64. Another important means of support for the training activities in developing countries is that of

[9] The course programmes are contained in *L'Institut de formation et de recherche démographiques (IFORD)* (Yaoundé, Nations Unies, République Unie de Cameroun, n.d.).

sending experts to administrative institu scholastic and extra-scholastic training (The number of experts provided by the U for training purposes is increasing contin

65. These experts offer their technical to Governments in several fields: demo collection; research; population programm there were 113 United Nations experts, hi in demography (headquarters professiona interregional and regional advisers, cou population programme officers. To these m 26 demographers working in the region commissions and at the United Nations E Social Office in Beirut (UNESOB).

66. Within the sphere of co-operation institutes, the United Nations has provided organizational support to numerous national and seminars. In the year 1972/1973, fina has been given to 10 national initiatives, national symposia and eight regional and seminars. [10]

Activities of the regional economic com

67. The various regional economic have carried out and are carrying out acti to those of the United Nations, either in aims fixed by the United Nations or else t own initiative in collaboration with other i and national organizations.

68. In operation at ECA is the Popu gramme Centre, which has organized conf seminars at which the problems of training of population have always constituted an primary importance. [11]

69. Five training courses have been co ECAFE in the evaluation of family pla grammes. Of the five, the courses in Indone Iran (1971) and the Republic of Korea (1 purely national; the course offered in In attracted observers from Iran and the whereas the one in Malaysia (1972) subregional nature, drawing students also Khmer Republic, Nepal, Singapore, Thailan Republic of Viet-Nam. A total of 124 persons trained. A course will be offered in Pakistan i

70. On other subjects, the following cour be mentioned: (*a*) two courses in the use of one in 1971 on fertility research (17 trainee different countries) and the other in 1973 on

[10] For information concerning prospects, see "T needs of the United Nations in demography", in IU mittee ... Working papers, pp. 169-178.

[11] "Demographic research and training in A CN.14/POP/53), paper presented at the African Conference, Accra, Ghana, 9-18 December 1971 tional co-operation in demographic research and Africa" (E/CN.14/POP/97); and "Aspects of d training and research in French-speaking Africa a gascar" (E/CN.14/POP/89), papers presented at t on Techniques of Evaluation of Basic Demogra Accra, 16-28 July 1973.

TABLE 1. TRAINEES, BY COURSE AND BY COUNTRY OR AREA

Country or area of residence of trainees	CELADE[a] (1957-1971)				IIPS[b] (1957-1971)				CDC[c] (1963-1972)			RIPS[d] (1972)		IFORD[e] (1972)
	Basic course	Advanced course	Specialization course	Research fellows course	Certificate course	Diploma course	Family planning communication research course	Higher training and research in demography including Ph.D. students	General diploma course	Special diploma course	Research course	First diploma course	Second diploma course (M.A.)	High-level course
Argentina	27	19	7	1										
Bolivia	8	2	—	2										
Brazil	15	5	1	1										
Chile	38	14	4	1										
Colombia	26	5	1	1										
Coste Rica	7	3	1	1										
Cuba	10	7	1	—										
Dominican Republic	7	2	—	—										
Ecuador	12	2	—	1										
El Salvador	10	1	—	—										
Guatemala	7	2	—	3										
Haiti	6	2	—	—										
Honduras	8	1	—	—										
Mexico	16	4	1	4										
Nicaragua	4	1	—	—										
Panama	12	4	1	—										
Paraguay	10	4	—	—										
Peru	17	6	1	—										
Puerto Rico	3	—	—	—										
Uruguay	5	3	1	—										
Venezuela	13	5	—	—										
Afghanistan					5	1	—	—						
Burma					7	—	—	—						
Ghana					1	—	—	—	4	—		2	2	
Guinea					1	—	—	—						
Hong Kong					4	—	—	—						
India					174	48	8	5						
Indonesia					15	2	—	—						
Iran					11	2	—	—						
Japan					11	1	—	—						
Laos					1	—	—	—						
Malaysia					1	—	—	—						
Nepal					2	—	—	—						
Pakistan					4	1	—	—						
Philippines					13	1	—	—						
Republic of Korea					13	1	—	—						
Republic of Viet-Nam					2	1	—	—						
Sri Lanka					7	—	—	—						
Thailand					13	2	—	—						
Western Samoa					1	1	—	—						

TABLE 1 (continued)

Country or area of residence of trainees	CELADE[a] (1957-1971)				IIPS[b] (1957-1971)				CDC[c] (1963-1972)			RIPS[d] (1972)		IFORD[e] (1972)
	Basic course	Advanced course	Specialization course	Research fellows course	Certificate course	Diploma course	Family planning communication research course	Higher training and research in demography including Ph.D. students	General diploma course	Special diploma course	Research course	First diploma course	Second diploma course (M.A.)	High-level course
Algeria									4	—				
Democratic Yemen									3	2				
Egypt									84	18	4			
Ethiopia									3	—		3	3	
Iraq									11	1	1			
Jordan									8	—	1			
Kenya									1	—				
Kuwait									3	—	1			
Lebanon									1	—				
Lesotho									1	1			1	
Liberia									3	—			2	
Libyan Arab Republic									11	1				
Morocco									5	1	1			
Nigeria									4	1		2	1	
Saudi Arabia									1	—				
Sierra Leone									2	—		1		
Somalia									1	—			1	
Sudan									36	4	2	2		
Syrian Arab Republic									24	6	1			
Tunisia									1	—				
United Republic of Tanzania									2	—				
Yemen									1	—				
Mauritius													1	
Uganda													3	
Zambia													1	
Dahomey														1
Gabon														1
Mali														4
United Republic of Cameroon														3
Zaire														1
Total	261	92	19	15	298	64	8	5	317	35	11	10	15	10

[a] Latin American Demographic Centre.
[b] International Institute for Population Studies.
[c] Cairo Demographic Centre.
[d] Regional Institute for Population Studies, Accra.
[e] Demographic Training and Research Institute, Yaoundé.

projections (25 trainees from nine countries), (*b*) a national training course on basic techniques of demographic analysis, which will be offered in the Republic of Viet-Nam during 1974.

71. The most relevant direct activity of the United Nations Economic Commission for Western Asia (ECWA) in training consists in the assistance of trainees sent to ECWA by countries where researches and surveys organized by Governments in co-operation with ECWA are taking place.

72. One of the aims is to act in order to make possible the teaching of demography in the national universities of the region of ECWA In October 1972, with the financial and technical assistance of the United Nations Fund for Population Activities (UNFPA), a department of demography was created in the Institute of Social Sciences of the Lebanese University and a similar department is in implementation at Alep University (Syrian Arab Republic).[12]

Activities of the specialized agencies

73. The training activities constitute an important part of population programmes of the International Labour Organisation (ILO). It organizes numerous seminars, regional and subregional, for "worker's education" and "employer's orientation", as well as "labour management seminars" on population and family planning. Topics relevant to population are also included in national courses of instruction for labour leaders and workers' education instructors.

74. The ILO proposes to introduce demographic topics into the educational activities concerning co-operatives and other rural institutions

75. As an indirect training activity, the ILO offers economic assistance through individual fellowships and the organization of study tours.

76. The International Institute of Labour Studies (IILS) has also introduced demographic topics into the leadership training courses for managers in the field of social policy, with particular respect to the links between population policy and employment and labour policy: a three-month course on "Population and Work" will be held at the end of 1974

77. The training activities of the Food and Agriculture Organization of the United Nations (FAO) are carried out through the formulation and fulfilment of Programmes for Better Family Living, which also include some information concerning population and family planning and which are destined for rural areas.

78. The training activities supported by the World Health Organization (WHO) are primarily integral components of projects focusing on the development of family planning within the general health services. These activities are also geared to the development of health manpower.

79. Population dynamics is often included as an important aspect of the content of the actual seminar, courses etc. Furthermore, WHO carries out various training activities in the collection and analysis of health statistics, particularly those more relevant to family planning programmes

National training programmes in the field of population

Type and extent of training facilities

80. A complete and exhaustive description of the regional situations is difficult because, on the one hand, there exist no exhaustive, comparable sources of information; and, on the other, it would not be possible to provide complete information here and, in particular, to analyse the content of the courses Therefore, only a synthetic picture will be given based on such material as has been available (and which is largely incomplete), distinguishing—in each region—four levels of demographic training which it seems appropriate to keep distinct. (*a*) extra-scholastic teaching; (*b*) primary and secondary school teaching, (*c*) university teaching, (*d*) post-university teaching

81. Naturally, no reference is made to demographic research in so far as it is carried out at institutions whose aim is research, but which do not include training activities.

Africa (ECA region)

82 In Africa, national training institutions in the field of population are lacking and training facilities rather scarce Only rare examples exist of national scholastic and extra-scholastic training programmes in the field of population.

83. An attempt was made in 1969 in Tunisia by a group of teachers working at the Institute of Educational Sciences of the Ministry of Education to devise a programme for primary schools which might develop an awareness of population problems; the attempt, however, has had no further developments and does not appear to have been carried into effect. In Africa South of the Sahara a Multinational Programme of African Social Studies is under way; this effort proposes to devise scholastic material for education in the field of population to be utilized in the 12 affiliated countries, the programme should be carried into effect by 1973

84. As concerns extra-scholastic training, note may be taken of the two-week seminars held at the end of 1972 in East Africa to discuss the possibility of including in community education programmes concepts also relevant to food and family planning. The following countries took part in the seminar: Botswana, Ethiopia, Ghana, Lesotho, Nigeria, Uganda, United Republic of Tanzania and Zambia[13]

[12] J. C Chasteland and J M Pelet, "Emploi des démographes au Service des Etudes Démographiques du Bureau des Affaires Economiques et Sociales de l'ONU à Beyrouth", in IUSSP, Committee . Working papers, pp 215-224

[13] Information about these programmes has been taken from S Viederman, "Population education· school and non [illegible]", a report prepared for the Sixth Natio[illegible]nferen[illegible]ciation of Population Libraries and [illegible]ion New Orleans, 25 April 1973.

85. The university structures in Africa currently allow little room for the teaching of demography.

86. Twelve-month courses in demography are now held regularly at the universities of certain countries: Egypt, Gambia, Ghana, Morocco, Nigeria, Uganda and United Republic of Tanzania. These courses are useful for the completion of the training of students specializing in statistics, economics, sociology, geography, administration etc.; they are inadequate, however, for the preparation of professional demographers.

87. The situation is even less favourable in other countries where courses in demography are optional and are not necessarily held each year: this is the case for the University of Yaoundé (United Republic of Cameroon), Abidjan (Ivory Coast), Tananarive (Madagascar), Dakar (Senegal) and for schools of statistics (INSEA at Rabat, ESIA at Abidjan, IFS at Yaoundé, EAST at Tunis, ENEA at Dakar). [14]

88. It can be said that undergraduate or graduate specialized teaching for the training of professional demographers does not exist (or almost so) in the national training facilities of the African countries. For this kind of training young Africans must take advantage of the regional organizations of the United Nations or else of facilities existing in countries outside Africa.

Asia and Oceania (ECAFE region)

89. A more disparate situation is to be found in the ECAFE region, which includes both highly industrialized countries and developing ones. Even if the indications provided for Africa are in part valid for ECAFE, the situation in this case is much better in that in many of these countries there already exist established scholastic and university facilities (often of a very high level) to which one can entrust the task of organizing demographic training programmes. It can be said, in fact, that informative-educational activities in the field of population emerged and developed mainly in Asia, also by reason of the pressing nature that the problem of demographic growth presents in the majority of Asian countries; for here—as opposed to Africa or Latin America—high growth rates occur in an area of already existing very high population density. This also explains the greater sensitivity to which this problem gives rise at the Government level.

90. At the current time, Asia is, perhaps, the continent where the most widespread attempts to begin education in the field of population in secondary and even primary schools are to be found. [15]

91. For some time now in India, the Population Education Cell has been established for this purpose at the National Council of Educational Research and Training (NCERT). In Iran, although a formal demographic teaching programme has not yet been devised (this is currently under discussion), secondary-school texts already contain information and knowledge concerning population. At the Central Education Research Institute in the Republic of Korea, programmes for secondary-school texts are being studied; while, since 1972, some elementary information on population has been included in primary-school texts. In the Philippines, the action of government and private organizations converge for the development of a general demographic education, and the Population Education Programme (PEP), established at the Bureau of Public Schools, has the task of co-ordinating the various initiatives within the framework of a five-year plan, which has already permitted schools to be supplied with primary teaching materials with the help of UNFPA. In Indonesia, the programme is extensive in its attempt to unite organically scholastic and extra-scholastic initiatives and accomplishments. This attempt is being made through the collaboration of both the Ministry of Education and the private schools of the Moslem Association with the help of UNFPA. Teachers in Thailand have analogously developed a plan, and a pilot scheme is currently in preparation to experiment with possible alternatives for teaching at various levels: the inclusion of demographic teaching in the programmes of other disciplines; distinct units to be used in existing courses; the development of separate courses. Lastly, in Malaysia and in Sri Lanka, a scholastic programme will be studied with the financial help of UNFPA. The East-West Centre at Honolulu, Hawaii, organized a workshop in the summer of 1972, in which teachers of four Asian countries took part (Indonesia, Malaysia, the Philippines and Thailand). Its aim was to discuss the planning and achievement of teaching programmes at scholastic and extra-scholastic institutions.

92. In the initiatives of the Asian countries, the emphasis is decidedly in the direction of family planning, which is also stressed outside school facilities. It is also, in fact, included in programmes on literacy, with which it is generally linked (India, the Philippines, Thailand and Turkey) and in the contents of education programmes for adults (Indonesia, Malaysia). [16]

93. The ECAFE region, in the period from August 1970 to May 1971, conducted an inquiry concerning the situation in the period from 1965 to 1970 and published the analytical results. [17] These results show that university teaching of demography is fairly widespread in the region, with a particular concentration of training facilities in certain countries (Australia, Iran, Indonesia, Pakistan, the Philippines, Thailand).

94. The basic characteristics of the regional training activities are:

(*a*) A rough balance between the number of

[14] "Demographic research and training in Africa", *op. cit.*; "International co-operation in demographic research and training in Africa" and "Aspects of demographic training and research in French-speaking Africa and Madagascar", *op. cit.*

[15] M. B. Concepción, *loc. cit.*; S. Viederman, *loc. cit.*

[16] Some areas have been omitted in this context. They constitute particular experimental areas for the implementation of population programmes.

[17] "Research, teaching and training in demography. A directory of institutions in the ECAFE region", Asian Population Studies Series, No. 8 (E/CN.11/1007).

obligatory courses and the number of optional ones (100/105);

(*b*) A very short or very long duration of obligatory courses (the long ones being held for the most part in *specialized institutions*) and an *intermediate* duration (between 50 and 149 hours) for optional courses;

(*c*) A generally short duration (less than 50 hours) for most undergraduate courses and a longer duration for graduate specialized courses,

(*d*) An approximate numerical equivalent between courses leading to lower university degrees (B.A., B.Sc., B.Soc.Sc. etc) and higher ones (M A , M P H etc.).

95. Tables 2 and 3 allow one to appreciate the geographical distribution of the courses and their nature as shown by results of the inquiry and its revision up to 1972.[18]

96 In Australia, graduate training in the field of demography is provided in the Department of Demography of the Australian National University at Canberra; in India, at the Indian Statistical Institute of Calcutta; and in Pakistan, at the Social Science Research Centre of the University of Punjab at Lahore Since 1953, demography has been included among the doctoral courses in the Department of Economy of the University of Chuo (Tokyo), and, recently, in courses in economics and sociology at other Japanese universities.

97. No information is available concerning the situation of training facilities or the existence of population programmes in China.

[18] "Research and training and the dissemination of the information and knowledge on population matters" (POP/APC 2/BP/12), paper submitted to the Second Asian Population Conference, Tokyo, 1-13 November 1972

TABLE 2 REGION COVERED BY THE UNITED NATIONS ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST CLASSIFICATION OF INSTITUTIONS BY COUNTRY OR AREA AND BY ACTIVITY IN THE POPULATION FIELD

Country or area	*Number of institutions in each field of activity*				
	Research	*Research and teaching*	*Teaching*	*Type unknown*	*Total*
Australia	4	6	5	—	15
Burma	—	2	—	—	2
Hong Kong	2	2	1	—	5
India	12	25	17	2	56
Indonesia	6	5	4	2	17
Iran	1	4	1	—	6
Japan	18	13	8	2	41
Khmer Republic	2	—	1	—	3
Laos	1	—	—	—	1
Malaysia	1	1	1	—	3
New Zealand	2	3	3	—	8
Pakistan	3	8	1	—	12
Papua New Guinea	—	2	—	—	2
Philippines	5	5	9	—	19
Singapore	1	2	1	—	4
Sri Lanka	2	1	3	—	6
Thailand	3	3	6	—	12
Republic of Korea	8	5	6	—	19
Republic of Viet-Nam	*1*	—	*3*	—	*4*
Total	72	87	70	6	235

TABLE 3 REGION COVERED BY THE UNITED NATIONS ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST CLASSIFICATION OF INSTITUTIONS BY COUNTRY OR AREA AND BY MAJOR FIELD OF INTEREST

Country or area	*Number of institutions in each field*									
	Economic	*Medical school and public health*	*Statistics*	*Sociology, social work, social science*	*Population and demography*	*Geography*	*Family planning*	*Other*	*Unknown*	*Total*
Australia	2	2	3	—	1	7	—	—	—	15
Burma	—	—	1	—	—	1	—	—	—	2
Hong Kong	1	1	1	—	—	2	—	—	—	5
India	13	4	7	10	10	5	2	5	—	56
Indonesia	9	1	1	—	3	2	—	—	1	17
Iran	1	1	—	1	3	—	—	—	—	6
Japan	13	10	1	4	1	2	1	6	3	41
Khmer Republic	—	—	1	—	—	—	—	1	1	3
Laos	—	—	1	—	—	—	—	—	—	1
Malaysia	1	2	—	—	—	—	—	—	—	3
New Zealand	—	2	—	1	—	5	—	—	—	8
Pakistan	1	—	4	2	—	1	4	—	—	12
Papua New Guinea	—	1	—	—	—	1	—	—	—	2
Philippines	1	3	1	7	1	1	—	3	2	19
Republic of Korea	3	3	1	6	4	2	—	—	—	19
Republic of Viet-Nam	—	—	1	1	—	1	—	1	—	4
Singapore	1	1	—	1	—	1	—	—	—	4
Sri Lanka	—	2	2	1	—	—	—	—	1	6
Thailand	—	3	—	2	2	—	—	5	—	12
Total	46	36	25	36	25	31	7			
Percentage	20	15	11	15	11	13				

Latin America and the Caribbean

98. In Latin America, there are conflicting views on the problem of population growth and on the advisability of encouraging decrease in fertility. As a consequence, different training facilities are found in different countries. As a general rule, there are no examples of the inclusion of demographic education at pre-university level, and university teaching tends to be directed towards a better insight into phenomena of demographic evolution, also because these are, for the most part, programmes devised by specialists and not conceived at government level as instruments of population policy. A characteristic case is that of Chile: on the occasion of the revision of the curriculum of social studies (1968-1970), a large part was given to demographic concepts and to an understanding of the inter-relations between demographic and socio-economic phenomena.

99. This latter view applies to most countries in the region; exceptions may be cited—El Salvador, Guatemala and Panama—where interest is beginning to be aroused in widespread education in the field of population; and especially Colombia, where the Colombian Association of Medical Faculties (ASCOFAME) and some teachers at the University of Cali have tried to integrate sexual, ecological and demographic education into multidisciplinary teaching. In fact, there are several courses in sexual education in Latin America, but they are based primarily on individual problems posed by the very high fertility of free unions—so widespread in the region—and are not intended as part of education in the field of population, far less as population policy.

100. The case of Cuba has to be mentioned because in that country rural schools have been established where concepts concerning population problems have been integrated in a general literacy programme.

101. Outside of school facilities, the attempt to introduce sex education among people at different levels of literacy is to be noted in Costa Rica (on the combined initiative of demographic institutions and the Ministry of Education) and in Colombia (on the initiative of the Colombian Association for Family Planning and the Coffee Workers Association).[19]

102. Even university teaching of demography is hardly widespread in Latin America. This is fairly significant because promotional action in this sense has had to come from CELADE, which, even through direct participation, collaborated with some universities in the region on the introduction of some courses in demography.

103. Cases of universities at which demography is taught regularly as an integral part of the curriculum are very rare. It has been taught since 1968 in the Department of Arts and Sciences of the University of Costa Rica (optional from 1968 to 1971, compulsory from 1972), and since 1972 in the Department of Economics of the same university. Specialized teaching in the Department of Economics of the University of San Carlos in Guatemala, though planned from 1969 was realized only in 1973. Courses are occasionally held—always in collaboration with CELADE—at the University of Cordoba (Faculty of Economics) in Argentina, at the University of Maracaibo (Faculty of Economics) in Venezuela, at the Catholic University of Rio de Janeiro in Brazil, at the University of Havana (Institute of Economics) in Cuba and at the University of Santiago (Institute of Economics). Analogous initiatives are under way in other universities (Brazil, Dominican Republic, Peru, Uruguay, Venezuela).

104. The general teaching situation of demography at university level appears to be relatively better in Central America than in the south, perhaps also because of the higher rate of population increase and the greater seriousness of problems it poses in the countries of Central America as compared with the south. There will be further developments on the problems of training in the field of population in Central America in the near future. In fact, by 1973, a seminar had been forecast on the situation and prospects of demographic teaching in Central American universities; this seminar—organized by the Central American University Confederation (CSUCA) in collaboration with CELADE—proposed to examine the possibility of introducing demography into training courses for economists, sociologists and other specialists.[20]

105. Concerning graduate training apart from the CELADE initiative indicated in paragraphs 39-43, mention may be made of a course held at the Colegio de México, the only example of a national training facility of graduate level in Latin America in the field of demography.

106. No mention has been made up to now of the Caribbean region, which, although geographically situated between Central and South America, must be considered apart, for cultural and historical reasons.

107. Even in this region, however, the situation of training in the field of population does not differ very much from the situation in Latin American countries. The official attitude towards such problems is, however, closer to that of the Central American countries, so that concrete initiatives in this field are probable for the near future.

North America and Europe

108. North America (Canada and the United States of America) and also Europe must be treated separately. Although there are notable differences between the situations in the two North American countries, in the countries of Western Europe, in those of Eastern Europe and in the Union of Soviet Socialist Republics,

[19] S. Viederman, *loc. cit.*; and "Report of the interregional workshop on population action programmes" (ST/SOA/SER.R/16).

[20] G. Maccio, *loc. cit.*

some characteristics may be considered common to these areas.

109. Here, in fact, it is in certain respects easier to attain the objectives of an adequate demographic preparation of a sufficient number of specialists in that there already widely exist scholastic, para-scholastic and scientific organizations into which a satisfactory form of demographic training could be fitted so as to produce a sufficient number of professional demographers

110. Conversely, however, other difficulties of a different nature sometimes arise. e g., in many European countries, an obstacle has been created through a certain rigidity of scholastic and cultural traditions, which have now consolidated structures that do not easily consent to the introduction of sectors of knowledge currently excluded from teaching schemes.

111. These difficulties are particularly evident in the teaching of demography at pre-university level Experiences so far on the subject have been very rare—if not non-existent—so that it could be said that everything is yet to be done.

112. Only recently has the problem arisen and there are still no appropriate initiatives As far as Europe is concerned, only in Belgium does the problem of the introduction of the social sciences into secondary schools appear to have been at least faced (even if it has been only occasionally resolved), and the Belgium Society of Demography has been appointed to make proposals for the inclusion of demographic material in school geography, history and social science pro- [illegible]

113. Extra-scholastic demographic education, as well as the spread of demographic knowledge, also presents serious deficiencies, even if these are of different extent in the different countries, as a recent inquiry has shown. [23]

114 Specific initiatives in the field of demographic education directed towards the aim of family planning are more or less widely present, for the most part through the work of private institutions.

115. Far more differentiated is the situation concerning university teaching of demography, which is, in any case, based principally (if not even exclusively) on cognitive goals, with no consideration for possible political-operative aims.

116. Both in North America and in Europe, many kinds of demographic training have been in operation for different lengths of time and in various measures: in the sphere of the medical and public health sciences, in the sphere of the social sciences; autonomous demographic training for the preparation of professional demographers; and graduate demographic specialization Moreover, rarely does one find all these different types of demographic preparation in operation simultaneously in the same country. Each of them is further carried into effect in very different forms, and it is difficult to provide a synthesis of information valid for all countries [24] However, a few general indications may be given, distinguishing between undergraduate level (widely developed) and post-graduate level (still insufficiently widespread, especially in Europe).

117 *As concerns the undergraduate level, a general* observation can be made, though such an observation is, of course, not quantifiable since surveys on the subject are lacking [25] demography courses are everywhere for the most part optional and brief

118. The teaching of demography in the medical field is—when it exists—generally fragmentary and rarely such as to provide students with a clear view of the link between population dynamics and population structure in relation to their medical and public health implications Specific teaching in family planning is an entirely particular case It is generally more of a medical nature (contraceptive techniques) than of a demographic one. [26] The existence of demography courses in the context of the more properly biological sciences is absolutely exceptional. Recently, however, scientific developments in the field of ecology have forcefully shown the need for demographic training for biologists requiring an over-all view of the development of the entire ecological system [27]

119. The teaching of demography as part of the economic and social sciences is very widespread, especially in English-speaking countries where demography is generally taught in sociology departments for historical and cultural reasons, since the problems of social demography or, if one prefers, of demographic

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[illegible] 1973

[23] E. Sonnino and A Golini, "The dissemination of demographic knowledge in some industrialized countries", in International Union for the Scientific Study of Population, *International Population Conference, 1973* (Liège, 1973), pp 143-151.

[24] A synthesis of general information for some European [illegible] pp 103-108

TABLE 4. COURSES BY TYPE OF TEACHING, SELECTED EUROPEAN COUNTRIES, 1970

Type of teaching	*Belgium*	*Bulgaria*	*Denmark*	*France*	*Germany, Federal Republic of*	*Hungary*	*Italy*	*Netherlands*	*Poland*	*Portugal*	*Sweden*	*Turkey*	*United Kingdom*	*Yugoslavia*	*Total*
Elementary course in demography	8	1	2	16	2	2	18	4	1	1	1	3	6	4	69
Demographic analysis	4	1		10	4		5	7	2			2	1	2	38
Demographic data collection	1			11			3					1			16
Other demographic techniques	2			13	2		1		1	1		1	1		22
Geography, urbanization and demography				12	8		3	1				1	4	5	34
Economics and demography	3	1		14		1	4	2	3			2	1	1	32
History and demography	3			8	3		4						4		22
Sociology and demography	4			8	5		5	1	1			2	3		29
Biology, public health and demography				13	9		15			1		2	3		43
Population theories and policies	2	1		7	1		1			1					13
Other kinds of teaching	1			15	3		2		3	1		3		1	29
Total	28	4	2	127	37	3	61	15	11	5	1	17	23	13	347

sociology, were in the past a relevant and basic part of sociological research

120. The teaching of demography in the context of economic sciences is also widespread, especially in Europe. However, here—as in the former case—it can be said that it is scarcely (or at least insufficiently) integrated into general training.

121. The teaching of demography in the context of training in sciences other than sociological and economic ones is far less widespread and absolutely fragmented. In some cases, demography courses are part of historical curricula and more frequently of geographical curricula. In both cases, the courses are generally on particular subjects and are not general courses capable of providing an even elementary demographic training.[28]

122. As concerns the training of professional demographers, the situation varies considerably from one area to another. In general, it is at graduate level

123. Demography departments or similar institutions supplying undergraduate and/or graduate level training are fairly numerous in the United States of America (Princeton, Chicago, Michigan, Pennsylvania, Brown, Washington, Berkeley—currently not functioning, North Carolina, Harvard, Cornell, Duke, Southern California, Florida, Pittsburgh) There is a demography department also in Canada at Montreal University

124 In Europe, a department of demography is functioning at Louvain (Belgium) An undergraduate over-all specialization in demography—currently still being developed but not yet sufficient—is provided in Italy in the Faculty of Statistical, Demographical and Actuarial Sciences of the universities of Bologna, Padua and Rome The European examples of graduate demographic training are at the London School of Economics and the Institut de Démographie de l'Université de Paris (IDUP).[29]

125. What has been said in paragraphs 101-119 essentially concerns the United States and Canada, on the one hand, and the countries of Western Europe, on the other

126 As concerns the countries of southern Europe (Greece, Malta, Portugal and Spain), it can be said that the situation is far less favourable. Demography does not form the object of independent teaching courses, population problems are not given any particular attention by the respective Governments and professional demographers are almost entirely lacking, a fact which is a consequence as well as a cause of the marginalization of demography

127. In the socialist countries of Eastern Europe and in the Soviet Union, the situation is entirely different. Here, political and scientific interest in population problems is very much alive; and demographic teaching and research are, for the most part, integrated into the academic structures in which demography is set—sometimes even in specific sections—in a multidisciplinary context. Although with certain differentiations from one country to another, due both to different cultural traditions and to differences in the current demographic problems, this type of interdisciplinary training of demographers has become richer over the last years in the sense of an increasing development of formal demography, which had for some time been fairly neglected in training programmes.

128 In Israel (which is often considered in the European area) a department of demography is functioning at the Hebrew University in Jerusalem

General considerations

129 To conclude this rapid survey of the current state of national training facilities, one can attempt to identify some basic characteristics which differentiate from one region to another

130 As concerns Africa and, above all, Africa south of the Sahara, the situation is very backward Serious economic under-development and other socio-environmental conditions have so far represented [illegible]

dissemination of demographic information and training This has given rise to a sort of vicious circle which is only now beginning to be broken, thanks to aid supplied by the United Nations and by other institutions (international and extra-African national institutions)

131. In recent years, a first effort to establish and develop national training facilities has begun to make itself felt. The organization of such structures must naturally be consistent with local necessities and be co-ordinated with research

132. The case of Asia is very different It can be said that efforts to provide demographic information and training are considerable in almost all the developing countries of Asia. In these countries, strong demographic pressure caused by a high rate of population growth in already densely populated territories is perceived by most Governments. The latter have therefore directed their efforts especially towards family planning programmes, organizing a very broad network of school and extra-school facilities and dealing also with the training of professional demographers.

133. The case of Japan is unique It is the only Asian country in a stage of advanced industrialization that has managed rapidly to reduce its rate of population growth Faced with demographic problems of a different nature, Japan is now reconverting and developing its training facilities, particularl · with a

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[28] T H Hollingsworth, "The teaching of demography in history", in IUSSP, Committee Working Papers, pp 129-148, J I Clarke and L. A Kosinski, "The teaching of demography within the science of geography", in IUSSP, *ibid*, pp 47-70

[29] For an illustration of the use made of graduates of the Institut de Démographie de l'Université de Paris (IDUP), see M P Clerc, "Les diplômes de démographie issus de l IDUP", paper presented at the International Population Conference, Liège, 1973

to providing researchers in different population problems.

134. Also in support of the needs of the countries of Asia, the authorities in Australia are concerned, above all, with the training of high-level demographers.

135. Latin America and the Caribbean area are characterized by a contradictory situation resulting from differences in attitudes towards population growth. In fact, it is possible to identify two conflicting trends in these areas. One is a tendency towards initiatives having immediate operative aims, such as to disseminate family planning; the other is a tendency to consider demographic training to be non-essential and, in any case, to orient it towards more abstract aims. The first trend is spreading, especially in Central America and in the Caribbean, as well as in Mexico; the second is found, in the most part, in the South American countries.

136. The training systems of the industrialized countries, both of North America and Europe, are mainly directed to the abstract. Furthermore, as far as Europe is concerned, training facilities in the demographic field are, in most countries, quantitatively insufficient and qualitatively inadequate for producing professional demographers. It is true that the demand for demographers is—in the developed countries—very slight and such as to discourage the development or further development of training facilities in this field. However, it is also true that this demand must be stimulated by means of an effort towards education on population problems not only of public opinion, but above all of decision-making authorities.

Assessment of future needs

137. The pressing problems posed by the characteristics of demographic development and by the increasingly widespread tendency towards social and economic planning suggest, in general, that demographic information and training are insufficient. This consideration is valid both for developing countries and for developed ones. It is, above all, a quantitative deficiency, although training and information cannot be considered to be qualitatively satisfactory.

138. It has been stated repeatedly that needs for demographers in relation to the roles they are to carry out vary between developing and developed countries, and can also be different from one country to another. As a preliminary condition for the organization of training facilities, the problem is to identify these needs. However, for the different activities that may be required of the demographer, a basic general training is needed in which various specializations may eventually be inserted. Fundamental training facilities should be present everywhere, possibly set in or attached to universities or similar institutions, such as research centres.

139. An effort in this direction should be made in the developing countries as well. Here, the availability of training facilities of a regional character appears to be no longer sufficient. Although the latter have in the past and do still, to some extent, exercise an important role, they seem no longer sufficient for the task of training demographers of various levels for the entire territory they are intended to cover.

140. This is due not so much to the objective difficulties of bringing together young people from all countries of that area as to the advisability of gradually creating in each country a local point of reference to make the subsequent development of demographic research possible. On the contrary, regional centres could, in the future, be allocated the task of providing high-level training to prepare the future staff of national research institutions and teachers at university level.

141. It is not possible here to give reliable and acceptable figures concerning future local needs for demographers.

142. In a report presented at the African Population Conference (Accra, Ghana, 1971),[30] ECA had calculated that for the 41 independent African countries one could calculate a need for the next five years of five, 10 or 20 professional demographers for each country according to its demographic size (below 2 million, from 2 million to 5 million, from 5 million to 10 million population), whereas for some of the larger countries (Egypt, Nigeria, Zaire) the figure could reach 50. This need might subsequently double or even treble. For Africa alone, the need would therefore be of the order of more than 500 professional demographers, whereas fewer than 50 are currently available.

143. If one accepts the criteria of size adopted by ECA, it must be taken into account that: (*a*) Africa represents approximately 10 per cent of the world population; (*b*) the number of independent African countries represents approximately 20 per cent of all the independent countries; (*c*) in very large and populous countries, needs are undoubtedly greater because of the nature of a more articulated organizational structure and the degree of development of research and training facilities.

144. Even without a quantitative global estimate of national needs, to which those of international organizations must be added (United Nations system and other organizations),[31] one can appreciate the enormous gap between needs and availability. The number of specialists produced by the various institutions for demographic training from 1967 is only just over 1,000.[32] The number of demographers of middle-level and/or semi-specialized training produced by national training facilities is not known. Nevertheless, one is justified in

[30] "Demographic research and training in Africa", *op. cit.*

[31] The United Nations, which in 1971 employed 159 such people (not including those employed at the United Nations Economic Commission for Europe), of whom 129 were highly specialized, planned to increase the number of country experts from 40 to 150 a year and the staff of the regional economic commissions by 50 per cent; see M. A. El-Badry, *loc. cit.*

[32] The figure of 1,077 was ascertained in a survey conducted by the International Union for the Scientific Study of Population, the results of which have not yet been published. It covered the number of students trained in 25 international and national institutions from 1967 to 1972.

concluding that united efforts at national and international levels are needed to improve the situation and to shorten the gap between availability and needs.

Facilities needed to augment training

145. As has already been said, it seems necessary to develop training facilities both from a quantitative and from a qualitative point of view

146. From the quantitative point of view, it is necessary:

(*a*) To increase efforts to promote, wherever possible and in all countries of average and large demographic size, the establishment of national training facilities and, for smaller countries, a co-operation between countries in the vicinity for the establishment of subregional structures, trying to associate the greatest possible number of countries in this effort,

(*b*) To continue regional facilities to permit the training of demographers in those countries where it is not yet possible to develop national facilities and to supply staff with high-level qualifications

147. From a qualitative point of view it is necessary:

(*a*) To promote, as a pre-condition for demographic training, generalized literacy programmes in developing countries;

(*b*) To promote the necessary co-ordination of national efforts in the developing countries to adapt training facilities to local needs by working out syllabi for training courses answering to basic needs and to the more specific and most felt local needs;

(*c*) To promote, wherever possible, co-ordination between teaching and research facilities;

(*d*) To attend to the training of demographers of middle level as well as to that of highly specialized demographers.

148 However, these objectives require an initial effort to make the need for training of demographers felt at the political level This applies both to developing and to developed countries Without such an effort, it will be difficult to obtain an adequate development of national training facilities and a careful use of professional demographers, and it will be difficult to avoid the situation in which—as currently occurs in at least some countries—specialized demographers end up by carrying out functions for which their specialization is more or less irrelevant; or, vice versa, public and private institutions employ staff not specifically trained in demography for functions which it would be more advisable to entrust to professional demographers

Growing needs for interdisciplinary training in the field of population policy and programmes

149 There is by now general recognition of the fact that demography has an interdisciplinary character[33] as a bridge between biological and natural sciences it is by its very nature an eminently biosocial science. Its object—the population—being a collective phenomenon, such a science requires the use of statistical and mathematical techniques of analysis as its fundamental method of inquiry In particular, the current stage of development of demography is characterized by a growing methodological specialization accompanied at the same time by an increasing need for an integration of its contents with the contents of other sciences. It is therefore essential for the training of the demographer to be interdisciplinary.

Fields in which interdisciplinary training is most needed

150 It is not easy to establish which are the sectors, or rather the functions, for which the need for a demographer with interdisciplinary training is greatest Obviously, this need is equally pressing for research as for practical work.

151 In all stages of research—whether basic or applied—and, in particular, in its organization and in the interpretation of results, the demographer is required to set demographic phenomena in the situation in which they are taking place This is necessary in order to begin with valid working hypotheses and eventually to propose valid hypotheses for interpretation Obviously, this is possible only if the demographer's training is such as to give him an over-all view of development

152 The more specifically operative functions, such as the setting-up of population and family planning programmes, also require consideration of the determinants and implications of demographic phenomena. For these functions, as well, the demographer should receive interdisciplinary training

153. A strictly technical type of training does not appear to be called for in every case and for every activity Such a training would restrict the demographer's task to a purely subordinate and, on the whole, less useful function.

154 Obviously, in the case of exclusively executive functions (in surveying, in the statistical treatment of data, in the operative aspects of population programmes), the need for interdisciplinary training is far less, whereas it becomes essential for functions at higher level.

155. Nevertheless, it must not be forgotten that currently it is exactly the opposite which is feared. On the one hand, it is feared that the demographer might not be sufficiently specialized and therefore be undistinguishable from the "social [illegible]".[34] On the other, it is feared that—at an [illegible] level—the

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[33] This interdisciplinary character is reaffirmed in many official documents issued at the international level, see, for example, "Report of the [illegible] Workshop [illegible] grammes of Training in the [illegible] [illegible] SER C/98, E/CN 9/207, [illegible]

[34] R. Pressat, "La [illegible] nome et la préparation [illegible] Union for the Scientific [illegible] *Population Conference* [illegible]

demographer may be called on to carry out generic functions of a statistical-administrative nature or of a type even more foreign to demography. [35]

156. However, as concerns the former problem, the demographer's interdisciplinary training does not appear likely to affect his specialization. To guarantee the latter, it is sufficient for specific courses and, in particular, courses in demographic analysis to be given enough prominence in curricula and for practical training in demographic research to be carefully conducted.

157. As concerns the second danger (the non-specific use of demographers, even professional ones), it obviously derives from the persistent low awareness of some Governments and other policy-making bodies as to the importance of demographic problems and the need to have trained staff capable of dealing with them competently, and, therefore, the need to create specific positions for this purpose. It is not thus the consequence of over-generic professional training, but rather of a non-recognition of a particular specialization in demography as one which is essential for certain activities.

Alternate ways to provide training

158. As has been seen, the current situation varies not only at regional level, but from one country to another. It is, therefore, not easy to identify common and general characteristics. However, it does not appear advisable to establish rigid patterns for possible solutions, as one must take into account differences in training structures in different countries and differences in needs from the point of view of the professional use of demographers.

159. It is well to remember a few points laid down by the Workshop on Programmes on Training in the Field of Population. [36] The report lists three basic questions requiring answers:

(*a*) Whether demographic training should form part of university training, or should be organized outside the university;

(*b*) Whether demographic training should be provided at the secondary-school level, before entrance into a university;

(*c*) Whether demographic training should also be organized on the post-graduate level for keeping specialized personnel, who are already engaged in an active professional life, informed of current thought.

160. Obviously, there can be no single answer to any one of these problems, owing, clearly, to differences in training systems already in existence. Nevertheless, the workshop did outline some possible solutions. Demography was recognized to have an interdisciplinary and composite character and to cover such a variety of subjects as to form a complete curriculum. The institution in progressive stages of departments of demography and of demographic study centres was called for, especially in countries where such structures are still deficient.

161. The Workshop also recognized the need to organize specific training courses in co-operation with universities or even outside them when it is difficult to set demographic courses into university structures and, above all, when there is a lack of comprehension on the part of the authorities concerned of the importance of demographic training.

162. Attention was called to the need for national programmes to be sufficiently "dynamic and flexible in order to permit necessary continuous modifications as needed". [37]

163. One session of the last Congress of the International Union for the Scientific Study of Population (IUSSP) (Liège, 16 August-1 September 1973), was concerned with the problems of the training and roles of demographers taking into account the most recent developments on the subject. The Congress provided further answers to the questions posed by the above-mentioned Workshop. The session stressed the need for demographic training and information at all levels:

(*a*) Teaching of demography to be included in secondary-school curricula as well as in university curricula, both in the context of biomedical and public health training and in that of economic and social training;

(*b*) The training of professional demographers at two different levels;

(*c*) Generalized demographic information for the entire population, both with the introduction of basic demographic knowledge, in primary school curricula and with the aid of mass communication media.

164. The Committee on Interdisciplinary Training in Population Matters [38] decided to give priority to the consideration of the following types of training:

(*a*) High-level institutional training which would permit persons of different types of specialization to receive training in a balanced multidisciplinary programme. The aim of such a training, oriented to highly specialized trainees, would be to promote research and studies needed for better understanding of the interrelationship of population to other developmental factors at the national and international levels;

(*b*) Long-term in-depth training in various aspects of population policy (including family planning) for filling gaps in the post-graduate level of training now given in demography, public health and related fields;

[35] This also happens in the case of demographers trained in high-level institutions; see M. P. Clerc, *loc. cit.* It can be observed in developing countries as well. See "Matters on demographic training and research in Africa arising from ECA meetings" (E/CN.14/POP/105).

[36] "Report of the Interregional Workshop on Programmes of Training in the Field of Population", *op. cit.*

[37] *Ibid.*

[38] The Committee was established in April 1973. A progress report of its work was presented to the Population Commission at its seventeenth session (E/CN.9/289/Add.1).

(c) Short-term courses and seminars in which persons at higher administration and decision-making levels could exchange information and study new developments

165. The conclusions that appear to emerge from various meetings and discussions are the following.

(a) There is a double need, for demographic information on the one hand and for demographic training on the other,

(b) Demographic information should have the double aim of encouraging a demographic awareness in the general public, as well as an awareness of the importance of demographic problems on the part of the authorities (Governments, local authorities, education authorities). In order to achieve the former aim, the channels to be used are schools (knowledge and practical work on problems of development of the population in primary and secondary schools) and audio-visual means (television, broadcasts, documentaries etc.) Direct information to the authorities would require the institution of permanent links between demographic research centres and institutional bodies (political and administrative),

(c) Demographic training should begin with general knowledge of the problems and of the principal and most elementary techniques of analysis, and this kind of knowledge should begin to be imparted in secondary school so as to enable even students who do not continue after secondary school to be used professionally, after a brief period of specific training, at executive level for work related to demographic programmes (executive collaborators in demographic data collection, censuses, surveys etc.) and for family-planning programmes,

(d) Demographic information in primary schools and demographic training in secondary schools should not constitute an independent teaching subject, but should be imparted possibly through applications, examples and references of a demographic character in other subjects already taught in those schools (arithmetic, history, geography, natural sciences etc.);

(e) Demographic training at university level (undergraduate) should take three forms:

(i) General training set in the context of ecological, biomedical and health sciences;

(ii) General training in the context of the economic and social sciences (including regional and urban sciences related to territorial planning),

(iii) Specialized training organized in demography departments (or similar structures) for the training of professional demographers.

Neither (i) nor (ii) is intended for professional demographers, but for experts in the mentioned sciences and should therefore include only subjects of general demography. The training of professional demographers (iii) must also include an in-depth study of demographic analysis and of formal demography in the framework of mathematical and statistical knowledge,[33]

(f) Post-graduate higher training is needed to prepare research demographers and university teachers in demography;

(g) Specialized training outside the university both at middle and at higher levels is needed for specific tasks (for example, family-planning programmes) and to update professional demographers.

166 Undergraduate and post-graduate university training should make it possible for trainees to choose collateral courses as well, either in eco-biomedical or in economic and social sciences

167 The setting-up of facilities for the training of professional demographers deserves particular attention Such facilities are obviously demographic departments (or similar facilities) giving training at various levels (undergraduate and graduate), relating it to multidisciplinary and demographic research This link is useful and perhaps even indispensable for the training of professional demographers of middle and especially of higher level

Promotion of national efforts

168 The training of demographers is only very slowly becoming generalized at a national level This is due to the excessively low awareness of demographic problems and to the mistaken conviction that these problems can be satisfactorily analysed by scholars of other sciences (economists, sociologists, medical doctors or statisticians), as was the case in the past when scientific specialization was very backward and when demography had not attained scientific autonomy in method and in content

169 This also explains why—paradoxically—the need for a specialist demographic training in research and operative functions in the population field is less felt in countries which have a solid scientific tradition as compared with countries which have only recently acquired the modern forms of culture

170. It is not easy to say in which directions promotional action should be carried out to change this attitude of political and cultural bodies However, such action should undoubtedly develop in different ways according to actual situations, quite apart from a tendency—valid anywhere—towards the dissemination of demographic information, as the basic factor for an awareness of the importance of the problems and of the essential and irreplaceable function of specialists in dealing with them correctly. But even implementation along these lines presents difficulties when the existing structures are less than favourable to the encouragement of their development.

[33] For more detailed proposals of subjects to be treated in curricula for professional demographers, see R . "La démographie comme enseignement "mographes", *loc. cit*

171. Promotional action towards Governments and ublic opinion is obviously the task of all those (institu-ons and individuals) who, being aware of the need to reak a situation of indifference and disinterest, are apable of exercising it in the most various of ways and rms. It is demographers themselves who should itiate a campaign to disseminate information to the eneral public and, above all, to Governments and other olicy-making institutions in order to set the most impor-nt specific problems in every country in the broadest ossible over-all development picture and to support the eed for political action sustained by research on the roblems themselves. This is the first and, perhaps, the ost difficult effort which must be made. Once this first ep has been taken, the policies of Governments would ake it possible in each country to create jobs for rofessional demographers, a fact which would in turn imulate the development of training structures. xperience has shown that it is not easy for the mere resence of specialists to create a demand for work, hereas the stimulus that the demand for work exercises more effective and more rapid.

172. Naturally, favourable circumstances are ecessary for the process to be initiated. Such circum-ances do exist. The urgent need to deal seriously with e problems of development is widely felt; the im-ortance of the various aspects of demographic develop-ent within the context of these problems (population crease, its structural transformations, its distributive ndencies) is beginning to emerge with increasing vidence. However, they are still perceived subjectively very different extents and in many different ways. is therefore necessary to ensure wider subjective articipation in these problems. From this point of iew, the action of international organizations can be of rimary importance in exercising a stimulus in the irection of national political and cultural establish-ents.

AYS IN WHICH THE UNITED NATIONS SYSTEM CAN PROMOTE FUTURE TRAINING IN POPULATION

173. The fundamental function that can be exercised y international organizations in developing the training f demographers, and action in the population field in eneral, places the United Nations system first in pro-otional action. This is so for different, but equally alid, reasons in both the developing countries and in ore or less widely industrialized countries.

174. In developing countries, one of the fundamen-l obstacles to progress in scientific analysis and politi-al action—in the demographic field as well as in thers—is represented by the enormous disproportion etween needs and the real possibilities of meeting those eeds. Lack of financial means, technical structures and ualified staff makes this process of development xtremely slow, represents an obstacle to any indepen-ent research development and renders all political and perative efforts hopeless. The United Nations system is the most capable structure to exercise effective action in support of national efforts, making funds, equipment and qualified staff available.

175. The efforts that the United Nations system has already made for the developing countries in the field of demographic training have been described (see paras. 35-78). The first steps taken so far are worthy of further development. The creation of special training centres on a regional basis is undoubtedly an initiative that has given positive results; but it would probably be best, after this first stage, to direct action also (perhaps mainly) towards stimulating and favouring as much as possible the introduction of training in the field of population in the national structures of individual countries to ensure that the demographers' training shall be consistent with the specific reality of each country. Obviously, this requires a greater effort, both technical and financial, but it is in this direction that it now seems best to proceed. Assistance to Governments from the United Nations system to improve national initiatives might take the usual forms:

(*a*) Fellowships to be given to young people with a secondary-school education to enable them to follow courses in demography in universities or in national research centres;

(*b*) Funds to allow the setting-up or improvement of national training systems;

(*c*) Supplying experts to initiate or develop these systems.

176. The General Assembly of the United Nations (resolution 2211 (XXI) of 17 December 1966) recom-mended the strengthening and co-ordination of training and information research programmes in the population field. Along these lines, the Economic and Social Council adopted the work plan put forward by the Population Commission, which included the study of a project—to be carried out in co-operation between the United Nations and some of its specialized institu-tions—"to provide interdisciplinary training at a high level" and to "support research, particularly on popula-tion policy and family-planning programmes". [40] It was therefore decided to organize a mission whose aim was to carry out a study on the feasibility of the proposal. The mission's tasks were as follows:

(*a*) To determine the needs for interdisciplinary training, for research and dissemination of information in the population field in the developing countries;

(*b*) To establish—once the national and regional availability in this matter had been tested—the advisability and feasibility of an international institute for the above-mentioned purposes; and, in the affirma-tive case, to indicate its objects, the nature of its multidisciplinary training and research programmes, its specifications, its structure and financial implications.

[40] *Official Records of the Economic and Social Council, Forty-eighth Session, Supplement No. 3* (E/4768), para. 143.

177. On completion of its task (26 August-27 November 1970), the mission drew up a report [41] giving a broad illustration of arguments in favour of the institution of a World Population Institute to meet the growing and changing needs for demographic training, information and research in a world context. If fitted into the United Nations system, this institute would have been able to co-ordinate activities in population matters entrusted to the various institutions of the system and would have been in a better condition to guarantee a multidisciplinary approach. The report also indicated the various specific tasks of the proposed institute, among which training tasks were particularly numerous, both direct and in support of national initiatives.

178. In this regard, it may be observed that, subsequent to the conclusion of the mission, an International Co-ordination Centre for Demographic Research (CICRED) has been set up under the sponsorship of the United Nations following a meeting of a group of experts sponsored by the United Nations in 1971. [42] The Centre has its head office in Paris, and its activities in co-ordinating research carried out by national institutions can represent a considerable stimulus.

179. One might ask whether something similar—but more directly linked with the United Nations system—might not be set up for training activities

180. One must bear in mind the need for the United Nations to continue, in the short term, direct action in the training of demographers. However, in the long term, the United Nations might act in the development of national training systems, especially in the developing countries. A World Population Institute dedicated, in particular, to training could exercise a double function:

(*a*) Co-ordination of activities of all the various institutions of the United Nations system for the organization of training courses in population at different levels and with different contents, according to territorially differentiated needs, as has also been requested at the level of the regional commissions, [43]

(*b*) The working-out and putting into practice of an aid programme to Governments for the creation of training structures and to improve those already existing in the forms indicated in paragraphs 171-173.

181. It is well known that certain international institutions (International Union for the Scientific Study of Population, International Statistical Institute) carry out promotional activities in the field of demographic research and, directly or indirectly, in the field of demographic training This latter is also promoted by means of relevant financial aid put forward by certain institutions which—although of a national character—carry out an international role and, in particular, a role of assistance to developing countries (This is, for instance, the case for the Population Council, the Ford Foundation, the Rockefeller Foundation and various national organizations) In order to set all initiatives relating to training in the field of population and, in particular, the financial aid to promote it, in an overall programme, a permanent link between all those institutions and the United Nations could be most useful. This link could be brought about by the establishment of the World Population Institute

182. Apart from co-ordinating activities within the United Nations system the World Population Institute could also contribute towards a broader co-ordination of initiatives of multinational or national organizations which, although operating outside this system, carry out activities of an international character for the purposes of training in the field of population

[41] "The feasibility of establishing a world population institute" (ST/SOA/SER R/12).

[42] "Report of the Experts Working Group on Population Research in National Institutions" (E/CN 9/242).

[43] See "Matters on demographic training and research in Africa arising from ECA meetings", *op cit*

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172. Naturally, favourable circumstances are necessary for the process to be initiated. Such circumstances do exist. The urgent need to deal seriously with the problems of development is widely felt; the importance of the various aspects of demographic development within the context of these problems (population increase, its structural transformations, its distributive tendencies) is beginning to emerge with increasing evidence. However, they are still perceived subjectively to very different extents and in many different ways. It is therefore necessary to ensure wider subjective participation in these problems. From this point of view, the action of international organizations can be of primary importance in exercising a stimulus in the direction of national political and cultural establishments.

Ways in which the United Nations system can promote future training in population

173. The fundamental function that can be exercised by international organizations in developing the training of demographers, and action in the population field in general, places the United Nations system first in promotional action. This is so for different, but equally valid, reasons in both the developing countries and in more or less widely industrialized countries.

174. In developing countries, one of the fundamental obstacles to progress in scientific analysis and political action—in the demographic field as well as in others—is represented by the enormous disproportion between needs and the real possibilities of meeting those needs. Lack of financial means, technical structures and qualified staff makes this process of development extremely slow, represents an obstacle to any independent research development and renders all political and operative efforts hopeless. The United Nations system is the most capable structure to exercise effective action in support of national efforts, making funds, equipment and qualified staff available.

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[41] "The feasibility of establishing a world population institute" (ST/SOA/SER R/12)

[42] "Report of the Experts Working Group on Population Research in National Institutions" (E/CN 9/242).

[43] See "Matters on demography [illegible] Africa arising from ECA meetings [illegible]

Part Four

POPULATION AND DEVELOPMENT

POPULATION AND DEVELOPMENT*

*United Nations Secretariat***

1. Concern with the problems of population and development is widespread and may be expected to occupy a prominent place in the programme of the World Population Year, 1974 Although population problems affect the affluent, highly industrialized countries, it is in the developing countries that population is a critical, basic issue Economic and social, as well as institutional and political, obstacles to a better quality of life are manifold and diverse, and population trends and characteristics are elements common to many of them. At its current rate of growth, the Population Commission noted at its sixteenth session, world population is expected to double in slightly more than 30 years and this momentum of population growth is and will continue to be among the influential factors of economic and social progress with considerable repercussions on the behaviour and actions of both Governments and individuals [1]

2. A better understanding of the mutual and complex relationships between population and development is recognized as fundamental for the identification of critical problem areas, directing the orientation of development policies and the adoption of the demographic objectives and measures Commensurate with this growing recognition, there have been significant increases in information, research and analysis of the demographic aspects of development.[2] However, the processes of acquiring new information and developing research and analysis have been accompanied by a growing awareness of the limitations in knowledge and gaps and deficiencies in it [3]

3. Despite considerable progress in methods of data collection and the quantity and quality of the available statistics and data, fundamental demographic, economic and social statistics are still lacking or incomplete in many developing countries Significant gaps in statistics even remain in some of the most developed countries Improvements in the methodology of and facilities for data collection and the volume, scope and quality of statistics are essential for the development of adequate knowledge concerning population and development trends and for the formulation of policies and programmes in this field

4 Gaps in knowledge reflect in part the complexity of the associations and linkages involved A better understanding of population problems and their relationship to development requires an explicit recognition of the complex and interrelated nature of the development process in which population is an integral and crucial factor While population problems must be understood and responded to in the context of economic and social development, in the absence of a satisfactory theoretical framework, the needed multidisciplinary approaches and research fall considerably short of serving these requirements

5 An additional, complicating factor is the great variety in demographic and economic and social circumstances Although the fact of wide differences in those circumstances between the groups of more developed and developing countries has been recognized, the diversity between regions and countries within each of these groups has received comparatively little attention. Different national circumstances, while not altering the fundamental relations linking the demographic, economic and social variables, affect the magnitude and urgency of the problems involved. Specific substantive knowledge needed for policy formulation can be provided only through exhaustive research on national conditions

6. The value and usefulness of such additional information and knowledge depend ultimately upon their relevance for policy making and the formulation, implementation and evaluation of plans and programmes related to improvement in the quality of life. There is ample evidence that the increased knowledge of the interrelations between population and development has made an important contribution in this respect. Demographic factors and policies are increasingly being accepted as an integral part of development planning A growing number of developing countries have adopted policies and programmes directed

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** Population Division of the Department of Economic and Social Affairs

[1] See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No 3*, chap IX, annex to draft resolution, para. (3).

[2] See *The Determinants and Consequences of Population Trends*, rev. ed., vol I (United Nations publication, Sales No E.71.XIII.5), *Proceedings of the World Population Conference, 1965* (United Nations publications, Sales Nos. 66.XIII.5, 66.XIII.6, 66.XIII.7 and 66.XIII.8). See also the papers and proceedings of the regional population conferences in Africa, Asia, Europe and Latin America

[3] Reference to the major causes of these limitations is found in the report of the sixteenth session of the Population Commission See *Official Records of the Economic and Social Council, Fifty-second Session, Supplement No. 3*, chap. IX, annex to draft resolution, paras. (6)-(9) and (15)-(22)

towards absorbing the impact of demographic changes or influencing levels of population growth and trends in population distribution. At the same time, increasing awareness of the complex nature of the population and development problem and of the profound differences in national conditions has led to the widespread recognition that further research and analysis are fundamental prerequisites of policy orientation and formulation.

The theoretical framework

7. Although the population problem must be regarded as forming an integral part of the development process, the theoretical framework and the analytical tools for dealing with the demographic variables in terms of such a complicated system of interrelations are far from sufficient or satisfactory. The difficulties of identifying the variables and connexions involved, of determining the forms of the relations and of assessing the relative importance and significance of the variables and relations for the problems at hand, are formidable. In the absence of a comprehensive analytical framework or model, in which the interdependence between demographic and economic and social variables is explicitly specified and the variables themselves are determined simultaneously, the study of the interrelationship between population and development has, of necessity, been confined within circumscribed limits and depended upon imperfect tools. In reviewing the current state of knowledge, it would appear pertinent to consider these methods of analysis and their results in terms of the conceptual frame of reference in which population is viewed as one dimension in the complex and intricate system of interacting variables which integrate the development process.

8. Within this broad frame of reference, theories and models allowing for the mutual influence between economic and social variables, on the one hand, and demographic variables, on the other, are relatively few and, in so far as they exist, relatively elemental.[4] In the absence of an adequate theory of interaction, the study of the interrelations has concentrated on two separate issues:

(*a*) The economic and social implications of population trends, usually based on the assumption that the latter are exogeneously determined;

(*b*) The economic and social determinants of demographic patterns and trends, in general on the assumption that economic and social factors vary independently of population variables.

[4] The most familiar theory of interaction between population and economic growth is that based on Malthus' principle of population and the Ricardian concept of decreasing returns of land. Among the more recent attempts to formulate a theory incorporating the mutual relations between population and economic growth is that of Leibenstein. See H. Leibenstein, *A Theory of Economic-Demographic Development* (Princeton, New Jersey, Princeton University Press, 1954); and H. Leibenstein, *Economic Backwardness and Economic Growth* (New York, John Wiley, 1957).

Economic and social implications of alternative demographic trends

9. The study of the effects of population trends on economic and social development, it should be noted, has been mainly concerned with the relatively narrow, although complex, issue of economic growth and development and, particularly, the growth of income. Apart from studies dealing with the implications of population growth, composition and distribution for specific social sectors—such as education, health, housing and, to a lesser extent, social services—relatively little attention has been given to the links between population and the social dimensions of development.

10. The numerous ways in which population affects economic growth and social progress derive from man's double role as a producer and consumer. It is primarily through its dual role as a body of producers and consumers that population affects other economic and social factors, and it is the balance of these effects on productive performance and consumer demand which determine the demographic impact on levels and conditions of living.[5] That net effect, however, is the outcome of an almost infinitely complex network of associations linking population characteristics, such as size, growth, composition and distribution, and the numerous relevant economic and social variables. While recent analyses and theoretical formulations have made significant contributions to the understanding of the economic and social implications of individual demographic factors and the corresponding relationships, the problem of their integration into a comprehensive, analytical framework remains to be solved in the face of the complexity of the relations. The existing approaches for estimating and assessing the economic and social consequences of population trends, therefore, concentrate on what are thought to be the crucial determinants of economic growth and social progress by means of relatively simple analyses or models.

11. Thus, generally speaking, population growth and composition are held to influence the economy's output through their effects upon the basic factors of production. The modes of analysis may differ with respect to such specific aspects as the variables considered, the number and complexity of the relationships included and the level of disaggregation, but fundamentally the underlying methodology is similar. Departing from assumed population trends or given projections, inferences about their economic consequences are drawn upon the basis of their impact on one or more of the traditional economic inputs: land, capital and labour, which in turn are assumed to determine output through an implicitly assumed or explicitly formulated production function. It would appear that a review of these

[5] From the point of view of the individual or the family, the producer and consumer roles are customarily considered in terms of the life cycle. The development of an integrated approach to the demographic and economic processes at this micro-level has, until recently, progressed little.

methods and their results should address itself to two issues: first, the assessment of the impact of demographic factors on the economic inputs considered, and, secondly, the assessment of the contribution of these latter to economic growth or, more generally, the adequacy of the conceptual or mathematical model used

Population and land

12. Historically, natural resources, and particularly land, have been regarded as the critical variables in economic growth, and the debate on the implications of the relationship between population and land has been going on since Malthus This relation occupied, as is well known, a predominant place in Malthus' theory and those of most economists of the classical school. The scarcity of land, either in an absolute sense or in terms of land of good quality, in their view was the prime factor limiting economic growth. Sustained population growth would lead to an increasing pressure on land and, ultimately, to a state of economic stagnation, characterized by a stationary population, existing at the subsistence level.

13 The experience of the countries then in the process of development refuted these pessimistic views, and, as a result, the importance traditionally assigned to the role of land and, by implication, to that of the population-land ratio declined sharply [6] Rapid scientific and technological progress, the institutional changes within and the development outside agriculture greatly reduced the relative significance of the traditional input of land and the share of agriculture in total income and employment. These conditions, evidently, do not prevail in the typical developing country, where agricultural productivity and technology remain at low levels and the majority of the population and labour force still obtain their income from agriculture, and the available agricultural land remains a significant factor Nevertheless, agricultural, and for that matter over-all, development in these countries do not depend any longer solely upon the traditional factor of land, but upon a complex of variables, including technological progress, human resources and physical capital. It would be very difficult, if at all feasible, to isolate the specific significance of the population-land ratio from such a complicated network of interrelations and interactions, and to draw any generally accepted or valid conclusions concerning the importance of this ratio.

14. If any general inferences are possible at all, it would appear to be in the case of extreme situations It appears warranted to conclude that in some of the predominantly agricultural developing countries where the population-land ratio is very high and the scarcity of land is associated with low levels of productivity and a high incidence of underemployment, further increases in population cannot but have an adverse effect on agricultural and over-all economic growth [7] Conversely, it has been argued that in sparsely settled areas, economies of scale, the progressive integration of agriculture in the market economy, lower costs of transportation and so forth induced by population growth might be so important as to outweigh the additional cost resulting from the increase in numbers [8]

15. Generally speaking, the debate on the impact of population trends on agricultural and economic development is no longer solely a question of agricultural land The issues involve the problems of the role of given land resources *versus* that of the potential for technological progress The conclusions are much less than assured It is universally recognized that in a long-term perspective there are limits to the number of people the earth can feed or support For a more limited time-horizon, the possibilities for technological progress, it is asserted, are such that scarcity of land would not be an absolute impediment to agricultural and economic growth In the majority of the developing countries, with the possible and notable exception of those suffering from a heavy pressure on land, agricultural production could expand, it is argued, through the introduction and spread of new techniques, more rapidly than could population Apart from the fact that trends over the next few decades cannot be considered independently of a longer term perspective and the ultimate limits to agricultural land, there are other qualifications with respect to the possibilities for technological gains First, there is no assurance that the potential for technological progress will actually be realized, particularly since the complementary resources needed, including physical and human capital, are scarce in most developing countries. Secondly, even though the impact on agricultural development of high rates of population growth over the coming decades could be more than compensated for by rapid technological change, there is little reason to assume that the latter would not be as great, if population were to increase at a lower rate.

16 To the extent that demographic trends do not by themselves engender accelerated technological progress and productivity increases, it may be presumed that population growth and an increasing population-land ratio may not give rise automatically to a proportionate increase in agricultural production This potentially negative economic effect does not mean, according to various authors, that the failure of agricultural production to keep pace with population growth is primarily the result of the pressure of population on land or the rapid increase in numbers Low levels of productivity and income, the high incidence of unemployment and underemployment and the slow progress in agriculture must

[6] The greatly diminished emphasis on land as a factor in economic development was also found with regard to natural resources, in general Various authors, however, had already warned against undue optimism concerning natural resources before current problems became evident, for instance, J J Spengler, "The economist and the population question", *American Economic Review*, vol LVI, No 1, pp. 1-24, S Kuznets, "Population and economic growth", *Proceedings of the American Philosophical Society*, vol CXI, No 3, June 1967, pp 170-193.

[7] S Kuznets, *loc cit*

[8] Samir Amin, "L'Afrique sous peuplée", paper submitted to the African Population Conference, Accra, 1971

be fundamentally attributed to the lack of development, which is at the bottom of the poor utilization of human, physical and natural resources.[9]

Population and capital formation

17. The shift in emphasis away from land as a basic determinant of economic growth was accompanied by a correspondingly greater emphasis on the role of capital and capital formation. Following this trend, the relation between population and capital came to occupy a central place in the literature concerned with economic-demographic interrelations. The relations between population and capital formation, discussed first in the context of the developed, mature economy,[10] came to the fore especially in the post-war period in connexion with the crucial role assigned to capital formation in the development process of the economically less advanced countries. Increases in population and labour force, the argument goes, require investments to satisfy the needs of the enlarged population and to provide the additional labour force with the necessary equipment and material. The higher the rate of population growth, the larger would be the share of these "demographic investments"[11] needed to maintain prevailing levels of living in total capital outlays. Higher demographic investments would leave less of a margin for the "economic investments", defined as those leading to higher levels of income and productivity. Alternatively, the more rapid the increase of population, the higher would total investments have to be if given goals of increases in *per capita* income were set.

18. Rapid population growth, it is held, not only will claim a higher share of the forthcoming additions to the stock of capital in the form of demographic investments, but will tend to reduce the funds available for investment. A rapidly growing, high-fertility population characteristically has a high proportion of its population in the younger age groups. The satisfaction of the needs of these children, whether borne by the family or the society, will absorb income that otherwise might have been saved and raised the economy's productive capacity. The already insufficient rate of capi formation in developing countries would thus be furt depressed through the increased consumption nec associated with a rapidly growing population. In adc tion, higher population growth and the characteristi associated with it may, it is thought, divert investment from more directly productive uses to the less productive or less immediately productive uses needed to provide basic services, such as health, education and other overhead facilities.

19. The best-known model incorporating these relations, designed to evaluate the economic effects of a decline of fertility, the consequent slower growth of population and the reduction in childhood dependency, is that of Coale and Hoover.[12] Formulated with special reference to India, the model makes allowance for the implications of alternative courses of fertility and population change for consumption and savings and for investment. By distinguishing between investment needs engendered by population trends, on the one hand, and by other capital outlays, on the other, Coale and Hoover demonstrated that, under the assumptions made, a decrease in fertility accelerated the growth of total income and, in particular, *per capita* income. The findings of this and similar models suggest that the reduction of the high levels of fertility in developing countries would produce significant gains in the levels of income, and since they are cumulative, the benefits of fertility decline would be greater the sooner the decline begins and the longer the projection period.[13]

20. The use of the Harrod-Domar model and its variations for assessing the economic impact of different population trends has been questioned for a number of reasons. Some of the reservations concern, in general, the representativeness of this and similar demographic-economic models (see paras. 24-26). Others focus on the specific features of the model under discussion. With regard to the latter types of criticism, attention has been drawn to the difficulties of determining the levels of the capital-output ratios in view of the wide variations in estimates found in different countries and under different conditions. There are indications that the incremental capitol-output ratio may vary inversely with the growth of output,[14] and according to a recent study an

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[9] Alvaro López T... sobre población y desarrollo económico en Amér... *Conferencia regional latino-americana de pobla... 1970* (Mexico, D.F., El Colegio de México, 1... -21; S. Kuznets, *loc cit.*

[10] In these economi... tion growth or numbers were thought to ... sufficient "effective demand" and declining ... J. M. Keynes, "Some economic conseq... population", *Eugenics Quarterly Review*, ... ; A. Hansen, "Economic progress and ... growth", *American Economic Revie*... 1939), pp. 1-15.

[11] This terminology was in ... his *Théorie générale de la populatio*... s de France, 1956), vol. I, pp. 28

[12] A. J. Coale and E. M. Hoover, *Population Growth and ...onomic Development in Low-income Countries. A Case of India's* ... (Princeton, New Jersey, Princeton ...ity Press,

... Rupre... ahren, *Population Programmes* ...*mic an*... *opment* (Paris, OECD Devel... ntre, 1... table II.1, suggest that the ... vanta... lity expressed in terms of ... come ... models were found ... be ... consi... income for the ... ng ... were ... cent higher ... he ... y a ... 10 years; 15- ... t ... nd ... ter 30 years ... in ... the Coale- ... fferential ... erent ... t ... pa ... e ... ther ... d ... er ... *to* ...), ... d

inverse relation may exist also between the capital-output ratio and the rate of population growth, with [illegible]

21. Another question concerns the consumption or savings function and the presumed effect of the dependency ratio on consumption and, consequently, saving. The form of the saving or the consumption function in developing countries is a matter of conjecture and more complex than often assumed,[16] and the assumption of a simple function with total consumption or savings being determined by the level of *per capita* income has been questioned by several writers[17] There is also no agreement on the effects of the young age distribution on saving An empirical analysis suggested the existence of a negative relation between the dependency ratio and the savings ratio, reflecting, it is argued, the effect of the large expenditures children require and the high ratio of dependents to the working-age population.[18] Conversely, it has been argued that the needs of a child are, on the whole, smaller than that of an adult so that the high proportion of children would by itself not represent a heavier burden on consumption.[19] The Harrod-Domar model, it has also been noted, does not explicitly take into account the role of labour in the growth of output, but assumes a fixed capital-labour ratio, an assumption which may be justified for short-term analysis, but which is questionable for the treatment of long-term economic growth problems.[20]

Population, labour force and employment

22. Several models have been developed which incorporate the effects of changes in labour force together with that of capital in economic growth. Among these are the neo-classical models which usually include a Cobb-Douglas type of production function A model of this type developed especially for assessing the impact of different courses of fertility and population trends was formulated by Enke. Using a Cobb-Douglas production function, and allowing for technological progress, investment was assumed to be a residual after consumption Employment levels were considered a function of the increase in capital. Unemployment would emerge if capital accumulation were too slow to absorb the labour force, with actual employment levels depending upon the real cost of labour, determined in turn by the state of the labour market, that is, the unemployment rate Accepting "high", "medium" and "low" fertility assumptions, the positive impact of slowing down population growth on both *per capita* income and employment was found to be significant.[21] Although Enke's model and similar ones[22] which [illegible]

23 A variant of a model developed by Chenery[23] was used by Blandy[24] to estimate the effects of different rates of population growth on employment prospects in the developing countries. The basic Chenery model, which assumes that the output per head of population depends upon income per head and population, was amended assuming that employment in each sector of the economy depends not only upon output but, in some sectors, upon labour supply in the economy as a whole. The findings of the analysis, based on data for a number of developing countries, indicated that in the short run, lower population growth, despite contributing to a more rapid expansion of income per head, may have adverse effects on employment and the distribution of income In a longer time perspective, lower population growth would shorten significantly the period required for attaining a given level of development.

(Bern), vol XXI, No 1, pp 147-150, K Sato, "International [illegible] *Economic Development* [illegible]

[illegible] *Economic Review*, vol LIX, No. 4 (Supplement) (Sept. 1969), pp 886-896 Leff's findings were questioned by various authors See *American Economic Review*, vol LXI, No 3, part I (June 1971), pp 469-480, and vol. LXIII, No. 1 (March 1973), pp 232-234

[19] E Kleiman, "Age composition, size of households and the interpretation of per capita income", *Economic Development and Cultural Change*, vol XV, No 1 (October 1966), pp 37-58, *Idem*, "A standardized dependency ratio", *Demography*, vol 4, No 2 (1967), pp 876-893; Julio Morales Vergara, "Unidades equivalentes y necesidades de consuma en América Latina y crítica a la relación de dependencia convencional", in *Conferencia regional latinoamericana de población, México, 1970* (México, D F, El Colegio de México, 1972), vol II, pp 64-70

[illegible] the theory of economic [illegible]

[illegible] York, Population Council, 1971).

[23] H. B Chenery, "Patterns of industrial growth", *The American Economic Review*, vol L, No 4 (September 1960), pp 624-654

[24] R. Blandy, "Population and employment growth [illegible] introductory empirical exploration", *Inte[illegible] l Lab[illegible] [illegible]iew*, vol CVI, No. 4 (October 1972),

Population and the intangible determinants of economic growth

24. The fundamental question concerning the economic-demographic models used to assess the impact of population trends on economic growth, and specifically the economic effects of different courses of fertility, is the extent to which they represent a true reflection of the impact of demographic trends on economic growth and the economic benefits of fertility declines. A number of writers have pointed out that models of the type discussed are a highly simplified representation of a very intricate process, which involves a much larger number of variables and relationships than those considered in the models.[25] It has been stated that although:

"... macro demographic-economic models have contributed to a better understanding of certain aspects of demographic-economic interrelationships in the past decade, it was nevertheless felt that most of these models remain less than satisfactory as a guide to policy-makers for they fail to take account of the essential complexity of these interrelationships, and are not yet securely grounded on empirically verified behavioural relationships."[26]

25. The partial nature of these models is of particular relevance in view of the fact that over the past decade there has been an increasing recognition of the importance of the non-traditional factors in economic growth, such as human resources and skills.[27] Estimates of the contribution of different determinants of economic growth, mostly relating, however, to more developed countries, indicate that the part of the growth of output that cannot be accounted for by changes in the conventional inputs is by far the major factor in economic growth.[28] To the extent that the importance of the physical inputs, such as capital or labour, for the growth of output is overshadowed by such determinants as technological progress and improvements in the quality of resources, economies of scale and other productivity-increasing factors, inferences on the quantitative impact of population on economic growth based on the type of models described may over-estimate by a considerable margin the magnitude of the demographic effect. If so, rapid population growth would not be the major obstacle to economic development, nor would the latter be assured if the rates of population growth were to decline.

26. The preceding comments suggest not only that the contribution to economic growth of the inputs usually included in the macro demographic-economic models is not clearly established, but that the implications of demographic factors on these variables remain to be defined. Even though the magnitude of the economic effects of population trends may be in question, it appears evident that under the conditions prevailing in most developing countries, rapid population growth and the characteristics associated with it will tend to exert an adverse effect on economic development. First, although land and capital may not be the decisive factors in economic growth, an adequate supply of both is important for ensuring significant and sustained increases in output and levels of living, and high rates of population growth are likely to have a negative effect on their availability. Secondly, there is only scant evidence that gains in productivity would be dependent upon population growth and they would probably not be much smaller if population were to increase at a moderate instead of a high rate.

Population and structural change in the economy

27. Whereas the study of the economic implications of demographic trends has been mainly concerned with their effects on income, there is universal recognition that development involves much more than increases in total or *per capita* income. Economic development is associated with profound transformations of the society, pre-eminent among which is the shift from a largely subsistence economy to one dominated by modern, market-oriented activities and changes in industrial structure as a result of the displacement of agricultural by non-agricultural activities.

28. The development of the economically less advanced countries requires vast changes in the structure of the economy, but the implications of population trends for these transformations in the economy are not clearly established. Nevertheless, there is a general recognition that rapid population growth in developing countries may seriously hamper a balanced transformation and industrialization. High rates of labour force in combination with the excessive inflow of workers seeking employment in the modern sectors, whose labour-absorptive capacity is limited, may cause serious distortions in the process of economic transformation.

29. These problems have been considered particularly in the context of the development theory of the dual economy formulated by Lewis.[29] Assuming an unlimited supply of labour and limited capital resources he concluded there were two main sectors in the economy: the capitalist sector, defined as the one which

[25] G. Myrdal, *op. cit.*, p. 2075; S. Kuznets, *loc. cit.*; H. M. Raulet, "Family planning and population control in developing countries", *Demography*, vol. 7, No. 2 (May 1970), pp. 211-234.

[26] "Report of the Ad Hoc Committee of Experts on Programmes in Demographic Aspects of Economic Development, on its Meetings held at United Nations Headquarters from 29 June to 3 July 1970" (E/CN.9/239), para. 40.

[27] H. Leibenstein, "The impact of population growth on economic welfare—non-traditional elements", in National Academy of Sciences, *Rapid Population Growth* (Baltimore, Maryland, Johns Hopkins Press, 1971), pp. 175-198.

[28] R. M. Solow, "Technical change and the aggregate production function", *Review of Economics and Statistics*, vol. XXXIX, No. 3 (August 1957), pp. 312-330; E. F. Denison, *Why Growth Rates Differ. Postwar Experience in Nine Western Countries* (Washington, D.C., The Brookings Institution, 1967); S. Kuznets, *Modern Economic Growth, Rate, Structure and Spread* (New Haven, Connecticut, Yale University Press, 1966).

[29] W. A. Lewis, "Economic development with unlimited supplies of labour", *Manchester School of Economics and Social Studies*, vol. XXII, No. 2 (May 1954), pp. 139-191.

used capital, which absorbed only part of the available supply of labour, and the subsistence sector, in which the remainder of the labour force was found. The expansion of the capitalist sector would attract labour from the subsistence sector until the unlimited supply of labour is exhausted. Lewis did not discuss the role of population growth in this process in a systematic fashion. Several authors discussing the development of the dual economy have, however, noted the adverse repercussions of rapid population and labour force growth on productivity gains, wages and the pace of structural transformation.[30]

30. A number of two or more sector models exist, but those incorporating population growth, migration and mobility are few and, even then, the treatment of demographic factors is rudimentary.[31] Recently, an attempt has been made to introduce the population variable into the Lewis model of the dual economy Distinguishing between the agricultural and non-agricultural sector and within each of them between capitalists and low-income groups, the effects of different courses of fertility on savings and capital formation and, by implication, economic growth are traced.[32] The earlier mentioned study by Blandy, based on Chenery's model of industrial development, has estimated the effects of a reduction of population growth not only on the growth, but on the structure of employment.[33]

Population and urbanization

31. Among the most prominent characteristics of recent demographic trends are the rapid rates of growth of urban population and the large rural-to-urban migrations, particularly in the developing countries. The importance of the economic as well as social consequences of these transfers of population and of the rapid urbanization process is universally acknowledged. Rural-to-urban migrations are a fundamental condition for economic development and the structural changes which are part of that process. However, it is also widely held that in many developing countries factors may be at work which cause the pace of urbanization to be excessive. The rapid natural increase of the urban population combined with a large inflow of migrants, according to this view, result in an inordinate growth of the urban population in relation to the absorptive capacity of the cities in terms of employment, housing, social services and social amenities Nevertheless, comprehensive models incorporating the implications of total, rural and urban population growth and rural-to-urban migrations for economic growth and development and structural changes are, as has been stated, still lacking.[34]

Population and the demand for goods and services

32 The importance of demographic factors on the demand for goods and services is generally recognized, but the literature on the subject has placed most emphasis on the requirements for specific goods and services created by an increasing population and by changes in its composition In contrast, relatively little is known about the impact of demographic factors on levels and trends of effective demand and their exact place in the consumption function, in conjunction with the effects demographic factors exercise on income as a determinant of potential demand

33. Demographic aspects of demand have mostly been analysed in terms of the needs and requirements for such categories as food, educational and health facilities, housing and so forth Such estimates, abstract in the sense that they do not take into account the whole complex of factors determining actual demand conditions, mainly set out to determine future needs under projected or hypothetical conditions Based on *projected or predetermined trends in population size* and composition and assuming given standards or goals to be attained, total future requirements are estimated. Such estimates and the population projections underlying them are essential elements in formulating plans and programmes for sectoral development.[35]

34. Food is among man's basic needs, and the satisfaction of the minimum nutritional requirements is the primary prerequisite of the survival of the individual and of the society. With a considerable part of the world population living in areas where the supply of food is precarious, concern with the problems of feeding a rapidly growing population is widespread and is reflected in the estimates of future food requirements and demand prepared by the Food and Agriculture Organization of the United Nations (FAO).[36] These

[30] G. Ranis and J. C. H Fei. "A theory of economic development", *American Economic Review*, vol LI. No. 4 (September 1961), pp. 533 565; L. G Reynolds, "Economic development with surplus labour: some complications", [illegible] 1969), pp 360-372.

[31] J C H Fei and G. Ranis, *Development of the Labor Surplus Economy* (Homewood, Illinois, Richard D Irwin, 1964), D W Jorgenson, "The development of a dual economy", *Economic Journal*, vol LXXV, No. 5 (June 1961), pp 309-334, A. K Sen, "Peasants and dualism with or without surplus labor", *Journal of Political Economy*, vol LXXV, No 5 (October 1966), pp 425-450

[32] J Isbister, "Control de la fecundidad, redistribución del ingreso y tasa de ahorro en países de ingreso bajo", in *Conferencia regional latinoamericana de población México, 1970* (México, D. F., El Colegio de México, 1972), vol II, pp. 35-41

[33] R. Blandy, *loc. cit.*

[34] E M Hoover, *op cit.*

[35] "Report of the *Ad Hoc* Committee of Experts on Programmes in Demographic Aspects of Economic Development..." *op cit*, para. 60, "Report of the Interregional [illegible]

"Forecasts of nutritional requirements and the expected level of the demand for food", *Proceedings of the World Population Conference, 1965*, vol. I, *Project [illegible] Measurement of Population Trends* (Un[illegible] ns [illegible] n, Sales No.

and other studies confirm that rapid population growth in the developing countries signifies high rates of growth of both the requirements and the demand for goods and services. Although, as previously mentioned, it may be technologically feasible to feed a growing population, projections of food requirements (based on the expected future growth of population and on nutritional standards designed to reduce the incidence of undernutrition and malnutrition) indicate that an intensive effort on the part of the developing countries would be necessary to secure enough food to provide their rapidly growing population with an adequate diet. Projections of the effective demand for food, based on alternative population prospects and estimates of the future growth of income, indicate, in turn, that slower population growth would be a significant factor in reducing the expected future growth in demand.

35. Special attention has also been given to the demographic aspects of education, as is also reflected in the educational plans formulated for the developing regions.[37] Population trends and composition affect educational needs and capacity in a number of ways. The higher the fertility levels, the larger is the share of the school-age population in the total population. The educational burden on developing countries weighs heavier not only because the proportion of those in need is higher, but because the working population which has to bear this burden will tend to be relatively smaller. In addition, a young age structure with prevailing pupil-teacher ratios and enrolment implies the need for a larger number of teachers per thousand population. To the extent that rapid population growth is associated with high fertility and a young age-distribution, providing for the education of the school-age population places a heavy demand on national resources. The reduction of fertility and population growth may have a substantial effect on educational needs. It has been shown that, on the basis of different assumptions concerning the time period required to attain a high enrolment ratio and assumed future courses of fertility, either a very intensive educational development effort or a decline in fertility would be necessary to maintain the percentage of increased enrolment that would be normal in the case of population growth at a relatively low level.[38]

36. The implications of demographic trends for the supply of needs in the fields of health, housing and other social services can be assessed by similar methods. However, relatively little is known about the impact of population composition and growth on total needs and even less about the role of these factors as they bear on effective demand. The demographic impact on living conditions will depend, in the first instance, upon the balance of the forces of population acting upon the production of and demand for goods and services.

Population trends and economic and social welfare

37. The limitations inherent in the output or income concept as an indicator of development have long been acknowledged. Even so, income has occupied a central place in much of the literature on development, including studies on the relations between population and development. These studies have been concerned mainly with the impact of demographic factors on the growth of income and equate the latter with increased well-being and welfare. One approach, for instance, for assessing the welfare consequences, particularly the benefits to be derived from declining fertility, relies on the macro economic-demographic models, briefly discussed above. Assuming different courses of fertility, the welfare effect of demographic factors is judged by comparing the consequent different trends in *per capita* income and their differentials.

38. A more direct approach to assess the economic welfare aspects of different levels of population growth utilizes cost-benefit analysis. The application of the principle of comparing the costs and benefits of a project to population was developed by Enke. Formulating certain hypotheses about the lifetime production and consumption of a marginal birth, he estimated the economic value of preventing one birth by comparing its discounted lifetime product and consumption. Subsequently, he introduced further refinements, including the comparison of the rate of discount, which would equate the streams of production and consumption, with the rate of return on capital. A further extension of his analysis involved the confrontation of the percentage reduction of population growth with that of the increase in output which would result from a given investment in, respectively, birth control and capital goods.[39] Enke's models were extended by,

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66.XIII.7), pp. 419-424. For projections of the demand for food, see Food and Agricultural Organization of the United Nations, *Agricultural Commodity Projections, 1970-1980*, (Rome, 1971), vol. I, chap. 3; *idem*, *Provisional Indicative World Plan for Agricultural Development* (Rome 1970), vol. I.

[37] United Nations Educational, Scientific and Cultural Organization, *The Needs of Asia in Primary Education. A Plan for the Provision of Compulsory Primary Education in the Region* (Paris, 1961); *idem*, *An Asian Model of Educational Development. Perspectives for 1965-1980* (Paris, 1966); *idem*, *Conference of African States on the Development of Education in Africa, Addis Ababa, 15-25 May 1961. Final Report* (undated); *idem*, *Meeting of Ministers of Education of Asian Member States Participating in the Karachi Plan, Tokyo, 2-11 April 1962. Final Report* (Bangkok, 1962); *idem*, "La conferencia sobre educación y desarrollo económico y social en America Latina", in United Nations Educational, Scientific and Cultural Organization, Latin America, *Proyecto Principal de Educación. Boletin Trimestral, No. 14—especial*, abril-junio 1962 (Santiago), pp. 5-161.

[38] G. W. Jones, "Effect of population change on the attainment of educational goals in the developing countries", in National Academy of Sciences, *Rapid Population Growth* (Baltimore, Maryland, Johns Hopkins Press, 1971), pp. 314-367.

[39] S. Enke, "The gains to India from population control: some money measures and incentive schemes", *Review of Economics and Statistics*, vol. XLII, No. 2 (May 1960), pp. 175-181; *idem*, "The economics of government payments to limit population", *Economic Development and Cultural Change*, vol. VIII, No. 2 (July 1960), pp. 339-348; *idem*, "The economic aspects of slowing population growth", *Economic Journal*, vol. LXXVI, No. 301 (March 1966), pp. 44-56.

among others, Zaidan, who analysed the additional ways in which preventing a birth would affect the growth of *per capita* income.[40] Criticism of the cost-benefit approach has centred on such specific questions as the definition and measurement of costs and benefits, and methods of discounting, as well as more fundamental issues concerned with the validity of such a comparatively restricted approach for a problem which transcends the boundaries of economic calculations.[41]

39. The short-comings in the traditional, predominantly economic approach to development problems and its relationship to population have become more evident as, contrary to what was often assumed, economic growth, even where it was rapid, did not bring with it comparable improvements in employment conditions, the distribution of income or, in more general terms, social justice. Recent years have seen an increasing emphasis on a more inclusive and comprehensive concept of development, such as enunciated in the Action Programme for the Second United Nations Development Decade, which states that "the ultimate objective of development must be to bring about sustained improvement in the well-being of the individual and bestow benefits on all".[42]

40. As an outgrowth of this evolution of the development concept, the extent to which recent demographic trends have promoted or inhibited a more equitable distribution of income, equal employment opportunities and social justice is acquiring an increasingly prominent place both in policy formulation and in research. The lack of adequate data and the complexity of the relationships involved have been and continue to represent serious obstacles to a broadening and deepening of the scant knowledge of the impact of population trends on these issues.

41. In general terms, it has been noted that mass poverty and inadequate employment opportunities are fundamentally a reflection of underdevelopment and the structural imbalance associated with it, but that the rapid growth of population has been among the factors contributing to these conditions.[43] In many developing countries, the creation of employment opportunities has not kept pace with the rapid growth of the labour force—in part due to the introduction and spread of labour-saving technologies—resulting in a growing backlog of unemployment.[44] Rapid population growth through its potentially adverse effect on employment and on the integration of the entire population into the development process is also likely to affect negatively the distribution of income, but its specific effects are not clear.

42. Few analytical studies are available which provide a basis, even if imperfect, for estimating the employment and income distribution impact of the demographic factors. Enke, in an earlier cited study, assuming different trends in fertility estimated that unemployment after 30 years would be significantly less in the low-fertility than in the high-fertility variant.[45] Blandy, on the contrary, concluded on the basis of analysis of sectoral development, as noted, that lower population growth would cause a more rapid structural transformation of the economy accompanied by increasing unemployment and underemployment in the initial stages.[46]

43. There are even fewer studies dealing with the effects of demographic factors on the distribution of income. Some aspects of this question were touched on by Isbister in his model of the dual economy, concerned with the implications of population growth for capital formation.[47] In a further elaboration of this model, he concluded that if different groups in a society save at different average rates, fertility control may change the relative shares of income going to these groups.[48]

Implications of economic and social development trends for demographic change

44. In the same way as the study of the impact of demographic trends for economic growth focuses primarily on the primary determinants of output, such as land, capital and labour, the analysis of the economic and social determinants of population trends and patterns is fundamentally concerned with the main components of population change, fertility and mortality. A convenient framework for the explanation of trends in these variables is provided by the concept of the "demographic transition". Fundamentally, this theory assumes that each population, in the course of [illegible] economic and social development process, passes through various stages of growth under different regimes of fertility and mortality. The hypothesis of [illegible] process of evolutionary demographic change [illegible] a general, but undefined, [illegible] the process of development would appear to have a certain validity [illegible] transition theory has proved to be more [illegible] broad scheme for [illegible] demographic [illegible] as a tool for more detailed analysis.

[illegible]

[42] *International Development Strategy. Action Programme of the General Assembly for the Second United Nations Development Decade* (United Nations publication, Sales No. E.71.II.A.2), para. 7.

[43] *Attack on Mass Poverty and Unemployment. Views and Recommendations of the Committee for Development Planning* [illegible]

experience in development [illegible] Planning [illegible] E.72.II.A.[illegible]

[45] [illegible]

[46] [illegible]

[47] [illegible]

[48] [illegible]

45. Not only have historical trends shown that the transition itself and its pattern, sequence and timing may vary greatly from country to country and over time, [49] its linkage to economic and social development appears to be much weaker than was often assumed. Even in the currently more developed countries, the association probably was only a loose one. The steep mortality decline in the developing countries, made possible, at least in part, through the introduction of new techniques in the fields of public health, sanitation and medicine, has weakened even more the traditionally assumed relations between the transition and economic and social development.

46. With mortality change being, to a great extent, exogeneously determined and in many developing countries already at low levels, the predominant issue is that of fertility change and its determinants. The fact of the existence of a fertility differential between more developed and developing countries is well known. A United Nations study shows that the distribution of individual countries by levels of crude birth or gross-reproduction rates was strikingly bimodal with a clear distinction between a high-fertility and a low-fertility group and with few countries on the border line between them. The broad negative association found to exist between fertility and development for the two groups of more developed and developing countries was not evident within each of these groups. [50] A number of other empirical studies based on data for a number of individual countries suggested either only a weak association or no relation at all between fertility and such development indicators as *per capita* income. [51] The breach in fertility between developing and more developed countries and the lack of association within each of these groups has given rise to the hypothesis that a "threshold" of socio-economic development exists beyond which fertility will decline. Nevertheless, the first attempts to determine threshold values for a number of socio-economic indicators did not provide conclusive evidence of their existence. [52] An alternative interpretation is that fertility declines may follow the reductions in mortality more or less independently of economic and social change. [53] In general, however, it has been suggested that fertility change and economic and social progress are related processes, which are part of a broader process of cultural, institutional and political change in which the weight of purely economic variables may be quite limited. [54]

47. While a theoretical framework for studying the relationships between fertility and development at the macro-level is lacking, at the family level an economic theory of fertility has begun to take form. Leibenstein, some one and a half decades ago noted that the essential element to be explained in a theory of fertility behaviour is the incentives or rationale for the desire to have more or less children. He then reviewed the various types of utilities or disutilities of an additional birth. [55] Becker extended these ideas into an economic theory of fertility by stating that the decisions involved in the number of children desired are quite similar to those exercised in purchasing a durable consumer good. In addition, he argued, when planning the size of their family, parents plan for children of a certain quality. [56]

48. The economic theory of household choice was further developed and refined with respect to such aspects as the financial costs and benefits of children, the time and resources used in rearing a child, the opportunity costs, the non-pecuniary returns of children and the importance of permanent or prospective instead of current income in decision-making. [57] This approach, however, has also been criticized on the ground that children should not be equated with consumer goods. [58] Further, it has been recognized that at the present stage of knowledge no clear policy instead of current implications has emerged. [59] Nevertheless, the insight provided by analysing the motivations and factors in fertility behaviour may be significant for a broader understanding of the problems involved.

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[49] L. Van Nort and B. P. Karon, "Demographic transition re-examined", *American Sociological Review*, vol. XX, No. 5 (October 1955), pp. 523-527. P. Hauser and O. Duncan, "Demography as a body of knowledge", in P. Hauser and O. Duncan, eds., *The Study of Population. An Inventory and Appraisal* (Chicago, The University of Chicago Press, 1959), pp. 76-105; E. van de Walle and J. Knodel, "Demographic transition and fertility decline. The European case", *Contributed Papers, Sidney Conference, Australia, 21-25 August 1967* (Liège, International Union for the Scientific Study of Population, n.d.), pp. 47-55.

[50] "Conditions and trends of fertility in the world", *Population Bulletin of the United Nations* (United Nations publication, Sales No. 64.XIII.2).

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POPULATION TRENDS AND MODERN ECONOMIC GROWTH—NOTES TOWARDS A HISTORICAL PERSPECTIVE *

Simon Kuznets **

1. Birth and growth, youth and maturity, senescence and death, frame—if somewhat differently for males and females—the life span of an individual as a member of society. Demographic processes and structures, while resting on a biological base, have far-reaching [illegible] sequential roles—economic and social—of the demographically distinct groups. Conversely, economic and [illegible] maturity, occupation, and retirement

2. The economic growth process of a given historical epoch, characterized usually by distinctive major sources of increased capacity, must have specific effects on the demographic processes and structures. These effects are associated with the economic and social opportunities provided by the epoch's sources of growth and development and with the requirements that the current material and social technology imposes Modifications of the basic demographic processes introduced by economic growth and social development then become the bases that condition the further stages in the economic and social growth process

3. The following discussion concentrates, for greater relevance, on the interrelations between modern economic growth as exemplified by the process in the currently developed countries over the past two centuries, and the major trends in their demographic processes But a similar interplay between population and economic growth (including concomitant social development) could be traced for pre-modern stretches of history in the currently developed countries, or for those regions of the world in the recent past that have been relatively free of the impact of modern economic growth

INTERRELATIONS BETWEEN POPULATION TRENDS AND MODERN ECONOMIC GROWTH

4. The major demographic trends observed in the developed countries (largely Europe, the European offshoots overseas and Japan) over the long period since they entered modern economic growth are familiar and do not call for lengthy discussion [1] Of prime importance was the marked reduction in mortality, which raised life expectancy at birth from 40 years or below to close to 70 years. It had major impacts on the mortality of infants and young children, on the mortality (and associated morbidity) from infectious and related diseases and on mortality in the cities which had previously suffered from much higher death rates than the countryside This reduction in mortality was accompanied, but not simultaneously, by a decline in fertility The crude birth rates declined (in the older countries of Europe) from over 30 per 1,000 to well below 20, a trend that largely reflected intra-marital fertility and was a result of decisions by the families to limit the number of children It was not the result of any genetic changes, or of involuntary reaction by the human species to changes in material conditions associated with economic growth The combination of low mortality with low fertility—while still allowing for a much greater long-term rate of natural increase than that over the preceding centuries of higher birth and death rates—was new and unique. It had to be new because the opportunities for reducing the death rates to the low levels attained were new and unparalleled in the past

5 The foregoing comments may suggest both a close timing relation between modern economic growth and the downward trends in mortality and fertility, and a distinction between the long-term trends in mortality and fertility, in that the element of human choice and decision was absent in the former and of great importance in the latter. Neither suggestion is valid In many European countries, crude death rates declined in the eighteenth century and were in their low 20s by the

* The original text of this paper (E/CONF 60/SYM I/4) [illegible]

[1] The summary of population trends presented is clearly selective and cannot be viewed as an adequate survey The following United Nations sources were used *The Determi-* [illegible]

second quarter of the nineteenth century—preceding the initiation of modern economic growth by several decades. By contrast, in many countries, there was no further decisive decline of death rates until late in the nineteenth century, with most of the reduction concentrated in the current century—several decades after modern economic growth was initiated. Urban death rates were substantially higher than rural even in the first decade of the twentieth century, in the European countries and in the United States of America. Likewise, in the older European countries (but not in the United States), fertility did not begin to decline until well into the last quarter of the nineteenth century—with a substantial lag after the initiation of their modern economic growth. Despite the connexion between the delay in the decline of birth rates and the delay in the decline of mortality (and the latter provides only a partial explanation) and despite the connexion between the delay in the decline of mortality and the effects of rapid urbanization on the aggregate death rate, it still remains true that the timing of the broad association between modern patterns of mortality and fertility and modern economic growth is not close. The economic growth processes undoubtedly provided opportunities for reducing mortality and raised the inducements and requirements for lower fertility. But the opportunities were not so free of obstacles, nor the inducements and requirements so dominant in the early stages of the industrialization process, as to effect a prompt response in the demographic trends.

6. Nor was a strong element of social, or even individual, decision absent from the proximate factors that made for the reduction of mortality and for the delay in its decline in the nineteenth century. Granted that for an individual, the decision to postpone death is not usually a matter of choice, the views on mortality—particularly of children—changed slowly. The acceptance of their death as "usual", or even as an offset to the "improvidence of the poor" persisted. But it was the socially determined implemented decision that was more telling. If the reduction in death rates before the Second World War was due, as has recently been argued, to better nutrition and living conditions, and to public health and sanitation measures far more than to advances in medical care and knowledge, [2] the role of social decisions becomes patent. The provision of means of subsistence and of housing, and of generally improved living conditions, reflects policies on income distribution, prices of necessities, housing and treatment of the poor. Public health measures, involving political decisions on uses of funds and on regulations of the private sector and of individuals, clearly rested on a social consensus that was slow in coming. A delay in the latter would have delayed even further the decline in the urban, and hence aggregate, death rates. The long struggles of the public health reformers through much of the nineteenth century clearly indicate that even when the sources of high mortality were known, much effort had to be expended to secure the social decisions needed to reduce their impact.

7. The opportunities and pressures produced by modern economic growth led to decisions that were important in the reduction of the death rate and crucial in the decline of the birth rates, and affected family formation, location and migration and the life-cycle sequence of education, occupation and retirement. For a better understanding of these, note should be taken of some distinctive features of modern economic growth. The reference must perforce be brief and simple, but the features are sufficiently conspicuous and persistent and many of them amply documented, to minimize misunderstanding. [3]

8. First, the permissive basis for the great rise in *per capita* product, combined with high rates of population growth, was the rapid increase in tested knowledge of natural processes, applied to problems of production technology. This increase took the form of successive technological innovations, which in their spread into mass use raised product and productivity. They also led to further knowledge concerning the properties of nature and to invention of additional tools, which facilitated new discoveries—and thus led to further applications. The re-enforcing connexions between discoveries, inventions, innovations, applications, further learning, more discovery and so on, permitted the sustained pressure towards higher production levels. But the key link in this chain was the mass application of innovations for wide use, which meant that knowledge was directed towards agreed-upon useful ends, among which the provision of goods for ultimate consumption was paramount. It was hardly an accident that innovations relating to final consumption and consumer goods were just as prominent as those relating to producer goods and that the growth of consumption *per capita* was almost as great as that of total product *per capita*. This orientation of knowledge to useful ends and of production to ultimate consumption obviously has bearing on mortality—life and health being prime consumption goods. It also has bearing on fertility, in that the orientation toward greater consumption for the existing and next generations would, other conditions being equal, lead to the choices of fewer children. These implications will become clearer as one considers some other distinctive features of modern economic growth, closely connected with the one just mentioned.

[2] See T. McKeown, R. G. Brown, and R. G. Record, "An interpretation of the modern rise of population in Europe", *Population Studies*, vol. 26, No. 3 (November 1972), pp. 345-382; and on public health in the United Kingdom of Great Britain and Northern Ireland, most of the issue of *Population Studies*, vol. 17, No. 3 (March 1964), The Population Investigation Committee, London School of Economics, London.

[3] For a summary of the characteristics of modern economic growth see S. Kuznets' Nobel memorial lecture, "Modern economic growth: findings and reflections", in *Les Prix Nobel en 1971* (Stockholm, 1972), pp. 313-332 (reprinted in *American Economic Review*, June 1973). A more detailed discussion is given in the earlier monographs, *Modern Economic Growth: Rate, Structure, and Spread* (New Haven, Conn., Yale University Press, 1966); and *Economic Growth of Nations: Total Output and Production Structure* (Cambridge, Mass., Harvard University Press, 1971).

9. Secondly, a high rate of growth of product *per capita*, fed by successive technological innovations and their mass application, was, perforce, accompanied by rapid changes in the production structure of the country undergoing modern economic growth—the structure of the sectors in which the active economic members of the population were engaged—with consequent changes in the occupations and the geographical location of these participants. These rapid changes in the country's production structure were partially due to shifts in domestic demand reflecting different income elasticities of demand for various goods; partially to the tendency of the focus of innovations to shift from one sector to another, as the potentials of economic advantage of new applications shifted, and partially to the effects of innovations in transport, communication and the natural resource advantage among countries. Industrialization—the movement of output, capital and labour shares from agriculture to industry—has been the most prominent of these changes in production structure, but the shifts within the non-agricultural sector, particularly of labour towards the service—rather than commodity-producing industries, have been equally important. One implication of these rapid shifts in production structure for the theme here is that they widen the possibility of intergenerational breaks—with sons being attached to industries, occupations and locations different from those of their fathers to a far greater extent than in a more slowly changing, traditional economy. The effect on formation of families and, in general, on the ties of authority of the older over the younger generation, is obvious. Moreover, it is re-enforced by other aspects of this shift in production structure that have markedly influenced population trends.

10. One of the two most relevant aspects is the sharp rise in the proportions of capital and labour engaged in large-scale, non-personal enterprises—as contrasted with the decline in the proportions attached to small-scale, personal or family units. The other is the sharp rise in the educational and other skill requirements of labour. The rise in the size of the productive plant was associated with the economies of scale of modern technology. These economies were the results of technological properties of new sources of industrial power, or better controls over precision in fabrication and of major improvements in intra-plant communication—technological and social. The growth of the large-scale enterprise (the economic, not the production, unit) was also facilitated by the revolutionary changes in communication, and by the organizational innovations feasible with a technology the rules of which could be overtly formulated and easily and widely communicated—impossible on the basis of earlier personal master-apprentice relations. The requirements for more formal education and greater skills were in part a direct consequence of the larger scale of productive units and enterprises, which demanded adequate communication and understanding within the organization, in part a reflection of the increasing reliance of society on the production of new knowledge as a source of further growth and in part a result of the need for formal education as the basis for judging the equipment of would-be participants—given the system of recruitment into economic activity associated with modern economic growth, to be touched upon below.

11. The rapid shifts in production structure, the emergence of large-scale production plants and economic enterprises and the rise in educational requirements of the economically active groups in the population had striking effects on the location of population, internal migration, family formation and the typical life cycle of an individual or family unit. Describing these population trends as consequences or corollaries of modern economic growth, or responses by individuals and families to changing opportunities and changing conditions of exploiting these opportunities associated with economic growth, is partially a semantic problem. The important point is the coherence between the economic growth and the population trends, a basis for evaluating the current situation in both developed and developing countries.

12. Industrialization was associated with intensive modern urbanization because the former was accompanied by a rise in the scale of the productive unit to a point where the economies of scale demanded concentration of production and large bodies of workers, and induced the formation of new or larger cities. Even without economies of scale, the movement away from agriculture would have furthered urbanization: the emergence of specialized crafts in the Middle Ages led to some urbanization in the European countries even though the scale of handicraft production and trade was relatively small. Yet, it was primarily the rapidly rising scale of modern technology and the successful resolution of the problems of communication and organization that powered the movement towards the cities and their rapid rate of growth in the nineteenth and twentieth centuries, *pari passu* with the accelerated rate of growth of product and population. An additional and key permissive factor lay in the marked rise in labour productivity in agriculture, which made it possible for a small fraction of the labour force (well below 10 per cent in recent years) to produce enough agricultural goods to satisfy, at a high *per capita* level, the other nine tenths of the population. The rapid movement, suggested by these fractions, to high levels of urbanization, is clearly a product of modern technology and economic growth—much of it in response to economic scales of production and enterprise. The recent emergence of dormitory suburbs in the developed industrialized countries, an attempt at adjustment permitted by greater affluence, only confirms the element of economic pressure involved in the urbanization process in earlier decades.[4]

[4] For a summary of data on urbanization and discussion of concepts, see *Growth of the World's Urban and Rural Population, 1920-2000* (United Nations publication, Sales No.

13. Given the parameters of modern economic rowth, particularly those of the growth of sectoral emand for labour and the more limited parameters f population growth, rapid urbanization and rapid ructural changes within the production system could ot have occurred without vast internal migration. With iodern economic growth characterized by rapid strucıral changes, which imply wide differences in the rowth rates of the various parts of the structure, the isparities between differential rates of population inrease and differential rates of growth of demand for ıbour are bound to become wide. When the demand or labour in some new industries grows between and 10 per cent per annum, and that in the older ıdustries located elsewhere hardly grows at all, the ifferential in natural increase rates cannot accommoate itself to such disparities. In addition, there was, ırough most of the period, a higher rate of natural ıcrease in the countryside—where additional employıent opportunities were limited—than in the cities, in 'hich such opportunities grew more rapidly. Urbanizaon reflected only the major disparities between rates f natural increase and rates of growth of employment pportunities, and the internal migration implicit in it 'as only part of the stream augmented by intercity nd interregional flows (in some countries, the United tates, for example, immigration contributed to the djustment by its differential flow into those regions 'here demand for labour was particularly active). Such ast internal migration and immigration is important for ıe theme of this paper. It broke the ties between the articipant in economic activity and his family origins. made the migrant more receptive to economic opporınities. It changed the conditions of life and work, with 'hatever effects they may have had on family formaon and fertility and it re-enforced the increasing eparation between family and economic activity, which as been a most important consequence of modern conomic growth.

14. Migration only re-enforced the separation etween the family and economic activity that was nposed by the increase in scale of production and of ıe economic enterprise. Unlike a farm, a handicraft hop, a small store or an individual service activity, a ıodern large-scale plant cannot be contained within household. A large economic enterprise, demanding ırge amounts of fixed capital and with a perpetuating ıture not dependent upon any one person's or family's fe, cannot be effectively operated as a personal or a amily firm. It demands an overt, impersonal and ffective organization in which the roles, responsibilities and privileges are explicitly formulated and legally enforceable. The control and organization of large-scale production demand that it be separated from the household. The individual participants must perform their tasks within the plant or the office, away from their families and households. They thus become members of a group whose practices and discipline have only limited contact with the life of the individual participant as a member of a household or a family. As a result, a large volume of economic activity, formerly carried on within the households of traditional farmers, craftsmen, shopkeepers etc., has been removed from family activity. Moreover, the function of the family as an institution transmitting economic experience and skills from one generation to the next has been severely limited. While the process began with the removal of market-oriented activities from most families, it was followed by mechanization of household services, by professionalization and hence removal from the family of many educational services and by the shift out of the family and into the organized labour markets of an increasing proportion of domestic labour resources that previously had provided services within the family.

15. The removal of full-time economic activity from the family and household, and the resulting separation between the production plant and the home, were accompanied, and eventually re-enforced, by the revolutionary changes in the practice and criteria of recruitment of individuals into economic activity. Given the large scale of the modern plant and enterprise, the large numbers of active participants involved and the migrant origin of much of the available labour, it was impossible to recruit on the basis of personal knowledge of candidates and their family origins (although this approach was followed in the recruitment of unskilled immigrants through the ethnic "compatriot boss system" in some early phases of American growth). Furthermore, the requirements of rising education and other skills to handle effectively rather complex production tasks involving costly capital equipment made personal knowledge of an applicant far less important than knowledge of his testable equipment, whether it was manual dexterity, ability to relate to people, or general or professional formal education. The large numbers and the large economic magnitudes involved in adequate resolution of recruiting and staffing problems warranted a concerted and prolonged effort to develop an effective classification of the production tasks within the plant and enterprise and to formulate criteria of satisfactory selection. These were bound to replace the traditional type of recruitment based on personal knowledge of workers and of their family antecedents. The shift from recruitment on the basis of status, closely connected with family origins and warranted in earlier times by lack of better ways for judging the suitability of individuals for their economic tasks, to recruitment on the basis of a person's objectively tested capacity for performance, specifically

9.XIII.3), and the reference there to historical studies. Curent world-wide data on the structure of the labour force by ectoral attachments may be found in International Labour)ffice, *Labour Force Projections, 1965-1985* (Geneva, 1971), arts I-V. Historical data on industrial attachment of labour orce are given in P. Bairoch and others, *The Working Popuıtion and its Structure* (Brussels, Institut de sociologie, Uniersité libre de Bruxelles, 1968).

formulated to a well-defined range of production tasks, was a revolutionary change in the modernization of society in adjustment to modern economic growth. It had far-reaching effects on population and the life cycle of its members Economic activity and preparation for it occupy much of the life of an individual, from childhood through maturity. Major changes in conditions of entry, and implicitly in the criteria for rise within the economic system, that occurred in the shift in recruitment, were bound to have multiple and far-reaching consequences.

16. One immediate consequence was the rise in the level of formal education and the spread of formal certification. The educational system became increasingly involved in screening individuals and in directing them to more advanced levels roughly on the basis of ability—even if qualified by parental position and by surviving patterns of discrimination A growing proportion of the labour force underwent longer periods of general and professional training, which was supplemented at later stages of the occupational career A rapidly increasing share of economic positions was contingent upon formal certification, with respect either to educational levels attained, or to specialized skills, or to both. Thus, the trend within labour force away from entrepreneurial and self-employment to employee status, was accompanied by the trends to higher levels of formal and specialized education, professionalization of occupations and an extension of certification. The main bearing of these trends is the increased investment in human (as distinct from material) capital, prolongation of the period of education that kept the younger generation out of both economic and household activity, in separate schools, thus contributing further to the shift of the transmission of knowledge and experience between generations from the family and household to the non-family, non-personal institutions

17. The distinctive characteristics of modern economic growth described above—rapid changes in production structure, urbanization and vast internal migration (and immigration), the shifts of requirements and conditions of participation in economic activity and the associated increase of emphasis on education and training, and testable criteria of individual performance—all had profound influences on fertility, family formation and the life cycle of learning, work and retirement. These influences were not limited to the *urban populations whose proportions in the total were* rapidly growing. They extended also to the rural populations that were sending many of their younger generation to the cities and the conditions of whose life were also thoroughly affected by the higher educational and other requirements of modern economic growth In fact, the declines in rural fertility in a country like the United States of America were, at least before the Second World War, *relatively as great as those for urban fertility*, although the differentials tended to persist.

18. The decline in birth rates was clearly associated with the greatly increased costs of children, resulting in part from the withdrawal of their labour from the family *milieu* and in part from the requirement for a longer and more expensive span of education and training. Both of these costs were directly connected with the rearing of the next generation to economic maturity and with the upward mobility of the parental generation itself. These trends towards greater costliness of children were re-enforced by the shift to urban life and the competitive pressures of a rising standard of consumption in the cities and in the countryside The resulting decline in the size of the family was re-enforced by the separation of generations. Correspondingly, a trend developed towards the conjugal (or nuclear) family, characterized by "the relative exclusion of a wide range of affinal and blood relatives from its everyday affairs" and effectively limited to parents and their children largely below the adult ages and free from more extended family ties in the choice of mate in the process of family formation and in the choice of location [5] Further, the life cycle of learning, work and retirement changed markedly. The age of entry into the labour force in the developed countries rose substantially, associated largely with the prolongation of the period of formal education. The age of retirement from full-time economic activity dropped sharply, reflecting the more widespread employee status combined with the increased obsolescence of human skills and facilitated by institutional provisions for supporting the retired population Since all these demographic trends can be viewed as responses, to a greater or lesser degree, to the requirements for effective and productive economic activity under the shifting conditions of modern economic growth, when realized, they contributed significantly to the high growth rates of the developed countries. It is difficult to envisage modern economic growth without the reduced birth rates, the greater investment in human capital represented by education and training, the smaller family and the concentration of the labour force in the prime ages between late entry and early retirement.

19. The condensed summary of the interrelations between population trends and modern economic growth must be concluded with a brief reference to four major qualifications They are reminders of omissions to be kept in mind in evaluating the bearing of the past interrelations on the present and future

20. First, the coherence between the opportunities and requirements of modern economic growth and the response of the population trends should not be viewed as an easy and smooth process, characterized by close timing and a relatively close relation between the economic and demographic parameters The movement away from agriculture should not be viewed only as a

[5] The term "conjugal" and the quotation are from William J. Goode, *World Revolution and Family Patterns* (New York. The Free Press. 1963), p 8 This monograph presents an interesting analysis of the conjugal family as an "ideal type" concept, towards which the evolution of family in times tended to converge

response of labour to greater opportunities in industry and the cities. It could just as well have been the result of the push from the countryside produced by a shrinking market for agricultural products combined with advanced agricultural technology and institutions that displaced farm labour. The rapid changes in production structure stressed above meant not only greater opportunities in the rapidly growing sectors, but declining opportunities and technological unemployment in the slowly growing sectors; and the adjustment was never a simple and prompt transfer of displaced resources. As already indicated, the decline of both death and birth rates lagged for decades behind industrialization in many currently developing countries. In other words, much of modern economic growth took place before the modern demographic patterns emerged and also before the wide spread of literacy and education. The process was long, with leaps, lags and disparities in adjustment. Like all processes of change in economic and social performance and institutions, it was subject to distortions and changes in pace. Thus, the demographic patterns that developed were not closely tied in with economic growth. While, in general, birth and death rates are lower in the developed than in the developing countries, within the group of developed countries, such general indexes as *per capita* product and birth and death rates are not closely associated.

21. Secondly, the duration of the processes is partially due to the gradual spread, particularly of population trends, among the different social and economic groups within a developed country. The economic and social differentials among birth and death rates could not be considered in a brief summary. However, it is clear that the transition to lower birth and death rates, in response to greater opportunities provided by economic growth, could not occur simultaneously and at the same rate for all economic and social groups. [6] Some of the trends in the differential aspects of death and birth rates have significant bearing on changing inequalities in economic position and material welfare. At least the older countries (as distinct from the European offshoots overseas) may have experienced for a while a widening of the economic and social differentials in fertility, with possible widening of inequality in size distribution of income. But this topic requires more intensive study than is feasible here. It is mentioned only because of its possible bearing on the prospects in developing countries, once their transition to lower fertility levels begins.

22. Thirdly, modern economic growth spread gradually and began at different dates in the currently developed countries—these dates (rough approximations only) ranging from the late eighteenth century in the pioneering England, to the 1840s for several European countries and the United States, to the 1880s in Japan and to the 1930s for the Union of Soviet Socialist Republics (after an initial spurt in Russia in the 1890s). The international aspects of modern economic growth could not be covered in this summary; yet, needless to say, they affected population trends—not only through international migration, which was particularly open and responsive for the European countries of origin during the nineteenth and early twentieth centuries, but through the international demonstration effect of the declines in death and birth rates. The innovations in economic and social policies, and later in health technology, made in the pioneer countries could spread to others at lesser cost and input than required by the pioneers—just as the economic advance of the pioneer developed countries could be followed, at lesser cost, by other countries that were sufficiently prepared to take advantage of the opportunities. The reduction in the birth rates and the shift to the conjugal family, once they emerged in the pioneer developed country, could become readily known and even adopted as a desirable model by a growing segment of the population in the follower countries.

23. Fourthly, the interrelations between economic growth and population trends are, as already indicated, only part of the network of factors determining demographic patterns. What is more relevant, the connexions between economic growth and population trends are not only direct, but operate through what, from one standpoint, may be viewed as intermediate variables. Yet, each of the latter may have a life and effect of its own, both on population and on economic growth. To illustrate: modern economic growth has been associated with the increasing importance of the national sovereign stage which serves as the arbiter of conflicts generated by rapid economic growth, as the referee of the social and legal innovations stimulated by the latter and as the regulator of any difficulties deriving from the conflict between private and social interests in a complex market economy. The existence of this effective political and social institution meant that policies relating to both mortality and fertility could be adopted that would not have been possible otherwise. Another illustration: the greater urbanization, the formation of large cities, created a condition of anonymity among the inhabitants that was unknown in the rural and small town surroundings. This condition—a direct result of urbanization, not of economic processes—affected the consumption and living patterns and family formation patterns. Or consider the effects of the power of science and tested knowledge on the views dominating modern society—and, in particular, on the diminution of authoritarian religious belief, and hence on the teaching of religious institutions and doctrine concerning life and death. In this case, modern economic growth affects ideology indirectly through the demonstration of the power bestowed on man by tested knowledge that accepts no authority except that of observation, experiment and the canons of scientific inference. In short, both economic growth and modern population trends

[6] A recent summary is given in Gwendolyn Z. Johnson, "Differential fertility in European countries", in Ansley J. Coale, ed., *Demographic and Economic Change in Developed Countries* (Princeton, Princeton University Press for the National Bureau of Economic Research, 1960), pp. 36-76.

are parts of the whole modernization process that occurred in the developed countries over the past two centuries. The two have interacted not only directly, but also by means of other institutional and ideological variables.

Current problems

24. The bearing of the preceding discussion on current problems can be put in general terms Modern economic growth has provided opportunities for a great reduction in death rates. It has provided inducements and requirements for a marked reduction in birth rates, for a small, mobile family unit and for a great change in the life cycle of education, occupation and retirement But with successive innovations and the rapid structural changes underlying the high aggregate rate of modern growth, the response to opportunities and the adjustment to displacement and changing requirements were neither prompt nor smooth, if only because of technological unemployment and a push towards migration even before the pull became dominant. Differentials in birth rates, death rates and migration may have increased inequality in the distribution of income before institutional adjustments produced a shift towards greater equality. As exemplified by ecological and other [illegible] lems, that is, current developments that appear socially *undesirable and call for remedial policy action, are* largely the results of past growth in which unforeseen consequences of past desirable attainments have grown to dimensions sufficient to demand attention. Recognition of a current social problem is thus a judgement, in *terms of accepted criteria (which may change over time)* of undesirable consequences of some past positive achievement. Of course, a current problem that originated in past positive achievement is still a problem calling for action, but relating it to its origin places it in the proper perspective and within a fairly wide group of similar problems that may have been overcome. The ways in which the latter have been resolved deserve scrutiny, imitation or rejection.

25 Consider as an illustration—all that is feasible here—a conspicuous current problem, the high rate of population growth in the less developed countries. That rate puts an increasing burden on economic capacity and makes it increasingly difficult to raise the level of *per capita* product, to better the internal distribution of income and to accumulate sufficient reserves to escape any adverse effects on unavoidable fluctuations (in weather and crops) and of other uncertainties. According to recent estimates, in the less developed regions (Asia excluding Japan, Africa, Latin America excluding the temperate subgroup, Oceania excluding Australia and New Zealand), which in 1750 accounted for two thirds of world population, crude birth rates between 1750 and 1920 averaged slightly over 40 per 1,000, crude death rates averaged slightly over 36 per 1,000, and the rate of natural increase was barely 4 per 1,000.[7] This rate of natural increase was well below that for the developed regions, which rose from 4 per 1,000 in 1750-1800 to 9 in 1850-1900, and to 13 in 1900-1910. Then, for the three decades, 1920-1950, the death rates in the less developed regions declined to about 30 per 1,000, while birth rates remained somewhat above 40, which meant that the rate of natural increase almost tripled to 11 per 1,000, about the same level as for the developed regions in decades free of world wars or "great" depressions But the striking change came after the Second World War The death rate in the less developed regions, which stood at 28 per 1,000 in 1940-1950, dropped to 22 in 1950-1960, to 19 in 1960-1965, and to 16 *in 1965-1970, while the crude birth rate moved from* 40 per 1,000 in 1940-1950 to 43 in 1950-1960, to 42 in 1960-1965 and to 40 5 in 1965-1970 The crude rate of natural increase consequently rose from 12 to 14 in 1940-1950, to 24 in 1960-1965, and to 24.5 in *1965-1970. Such a rate of increase, about 2 5 per cent* per annum, was observed in the past only in the few exceptional developed countries (such as the United States before the late nineteenth century) that attracted large immigration and could take advantage of an abundance of natural resources Further, it was over twice as high as the long-term rates of population growth in the older developed countries of Europe and in Japan

26. The current medium projections assume that these crude rates of natural increase in the less developed regions will rise from 24 5 per 1,000 in 1965-1970 to 25 in 1970-1980 While this rise seems slight, even the continuation of the high growth rate for another decade poses a challenging problem The implications of the projection are even graver when one distinguishes between the East Asia region (692 million) and the others (with a population of 1,315 million in 1960). If one combines the remaining less developed regions (excluding the negligible group in Oceania), the crude birth rate moves from 46 per 1,000 in 1950-1960 to 45 in 1960-1965, to 44 in 1965-1970, and it is projected to 42.5 in 1970-1980—while the death rate drops over the four periods from 24 to 20 to 17, and is projected to 13 5. The rate of natural increase rises from 22.5 to 25.5 to 27.5, and is then projected to the record level of 29 per 1,000 in 1970-1980. That such a growth rate of population in the less developed regions, which account for about four tenths of world population, constitutes a major problem—if improvement in material

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[7] These and other estimates below are from United Nations, *The World Population Situation in 1970*, a highly useful review of current trends that includes a brief summary of historical antecedents. But the "medium" projection that it presents may already be seen to underestimate the decline in birth rates in the late 1960s in North America and in the Union of Soviet Socialist Republics, differing in this respect from the projections for the less developed regions. It thus appears the contrast in the growth rates of population in the [illegible] future between the developed and the l[illegible] deve[illegible] may be even wider than that [illegible] this report.

welfare is to be attained—can hardly be gainsaid. For both the high birth rates and the low death rates, there is ample parallel in the past. But there is no historical parallel for this combination of high birth rates with low death rates, especially for countries that are at the lower levels of current economic performance per head, nor is there parallel, in the history of modern economic growth, to such rapid declines in death rates (except in the few years of recovery after epidemics).

27. In the light of the preceding discussion, it is obvious that the problem is associated with the rapid decline in the death rates—a positive attainment, made possible in large part by modern economic growth. The high level of technological capacity in production as well as in the medical arts, the ability to establish rapid communication with, and penetration into, the economically less developed world, and the basic philosophy of the value of material welfare and of health, all contributed to this achievement. Although obvious, this comment needs to be made in order to stress that the problem originated in the effective spread of a major positive contribution. To be sure, the difficulties could have been avoided by an equally prompt response of birth rates. But the slowness of the adjustment should not blind one to the magnitude of the positive attainment, realized and projected. It can be argued that such a decline in death rates is an indispensable prerequisite of modern economic growth and that it is also a prerequisite of the decline in birth rates, in so far as they are determined by a given surviving size of family desired by the parental generation.

28. The second comment derives from a discussion of the connexion between modern economic growth and the decline in birth rates in the developed countries. The changed inducements and requirements of the modern economy, which made fewer children, with greater investment in their education and training, and a smaller family more attractive, were stressed. It was suggested that, in general, economic growth and modernization removed the need for a large family by shifting many of its economic, educational and protective functions to impersonal business or public enterprise, educational institutions and the State. These institutional-change corollaries of modern economic growth, components in the general modernization process, took time to evolve. So the decline in birth rates was both delayed and drawn out—particularly in the countries that entered modern economic growth first. The relevant question here for the less developed regions of today is whether the economic, political and social institutions have been restructured and the ideological views of society changed, to place emphasis on greater investment in fewer children and to provide political and social stability combined with internal social mobility that would enhance the interest of the parental generation in smaller families.

29. An answer to this demands more knowledge of the changing social and political institutions of the less developed regions than is at hand. The temptation to give a negative answer is great, but is not fully valid. Modernization has been initiated and substantial reduction in birth rates has been realized in several less developed countries. Yet, to point up the difficulties in establishing political stability, one need only mention the internal conflicts in such major countries of Asia as Indonesia, Pakistan and the Philippines, and of sub-Saharan Africa as Ghana, Nigeria and Zaire, and the spread of military dictatorships in much of Latin America and other less developed regions. The absence of political stability makes it impossible to generate a restructuring of economic and social institutions, which are often likely to sharpen the conflict between traditional and modern interests. The comment is made, despite limitations in current knowledge, in order to emphasize the connexion between declines in birth rates and the necessary transformation of economic and social institutions that would assure the interest of the parental generation in fewer children and in greater investment in human capital. A social and economic structure that provides no reward for fewer children, with slight prospect of a better future for them and their parents, would scarcely encourage low birth rates. This is not to minimize the effects of recent improvements in the technology of birth control in response to the recognition of a more acute need for them, nor of relevant changes in public attitudes and governmental policies—all of which may be needed to implement fully the interest in smaller families once it is established. However, far-reaching reductions in birth rates require an economic and social *milieu* that would not reward reliance on a genetic lottery, i.e., on a large number of surviving children, for lack of assurance that greater investment in fewer numbers would yield appreciable benefits—to the parental and to the younger generation.

30. Thirdly, once birth rates begin to drop in the developing countries, the reduction is likely to be evident first among some groups, usually those in the modern advanced types of professional and modern occupations and those in the upper income brackets. It will only later spread to the more traditional, and lower income, occupations. It may, therefore, for a time, have the effect of maintaining, or even widening, the already wide inequalities in income. The pressures, on national unity and on tolerance of continuing inequalities, of failure of significant benefit from whatever economic growth takes place are thus likely to become great—particularly because the spread of economic growth to the less developed regions is accompanied by the spread of modern views on the presumptive power of modern technology to bestow material benefits on all humanity and the demonstration effects of widespread high standards of consumption elsewhere. This means that, with respect to population, the developing societies must take account not only of the over-all difficulty of raising aggregate income *per capita* when the total rate of population growth is so high, but of the need to change the economic and social conditions of the large population groups at the lower rungs of the economic ladder to

assure their interest in fewer children and smaller families.

31. This suggests the fourth and most general *comment on the problem under consideration, in the* light of the earlier discussion of interrelations between population growth and modern economic growth in their historical perspective The adjustment that has to be made to the rapid decline in the death rates in the less developed countries is much greater and more pressing in many important respects than were the similar adjustments of the birth rates in the developed countries in the past Not only is the current growth rate of population in the less developed regions so much higher than that of the older developed countries in their long-term past, not only are the economic levels and reserves of the less developed regions so much lower than those of most currently developed countries in their pre-modern past; not only may the tolerance of economic deprivation and inequalities have been lowered with the spread of modern economic growth and modern views on the importance of equality of economic opportunity and of assurance of a minimum of material benefit for all groups; there is also a greater awareness of the connexions between demographic trends and the conditions of economic advance in the age of modern technology and modern economic growth and of the role that can be played by a more enlightened policy than the *laissez faire* and pro-natalist policy which prevailed in the currently developed countries in the past.

32. The foregoing comment should not be interpreted to mean that no economic advance would be *possible in the less developed regions of today, without* striking reductions in birth rates After all, despite the high growth rates of population, *per capita* product of the less developed economies grew over the 1950s and 1960s at a rate of about 1.5 per cent per annum (after all adjustments), which meant a rise over the two decades of about a third.[8] While this record looks good in comparison with the past, it is far short of that shown by the developed economies over the period. More important, it raises questions as to whether such a gain can be maintained with the continuation and, indeed, the projected acceleration in the rate of population growth Whatever the answer, the historical perspective *suggests that a more deliberate population policy might* consider not only the spread of knowledge of birth control technology, but ways in which the given institutional framework affects incentives on the part of a large proportion of people to shift towards greater investment in human capital and fewer children This means exploring changes in economic, political and social institutions that would enhance the interest of an increasing proportion of the population in the modern type of family—given the attainment of death rates low enough to approximate modern levels

33. As indicated above, the comments on the current problem of high rates of population growth in the less developed countries are illustrative More intensive consideration was impossible, partially for lack of knowledge and partially for lack of space In general, inferences from the past for the present and the future can only be suggestive One could have illustrated the relevance of the historical perspective to the problems of demographic adjustment in the developed countries—which are, however, quite different in range and emphasis from those stressed for the current problem for the less developed regions It was not feasible to do so here To conclude, the differences in the specific implications of the population adjustment problems between the developed and less developed regions, which are marked, are stressed—as are those even among some subregions within each of the two groups This means that the historical perspective would have *to be translated into rather different implications for the* two groups of countries, or for some subregions within each. Thus, although all peoples are inhabitants of one planet and members of world humanity, the population problems of the various regions are rather different This has its favourable aspects, in that not everyone is caught in the same bind that constrains many less developed countries, and resources can be transferred. But it also has its unfavourable aspects, in the sense that interests and concerns differ. However, regardless of the implications for policy in order to achieve better understanding, the interpretation of the historical perspective must be geared to the different problems of the several societies and regions. The analysis of what can be learned from the past must be refined and tested if it is to serve as a basis for more intelligent treatment of current population problems.

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[8] Estimates including the various adjustments are discussed in S Kuznets, "[illegible] developed and [illegible] *ment and Cult*[illegible] pp 185-209 [illegible] S Kuznets, "Postwar growth of less developed countries", paper prepared for the Rehovot Conference, Rehovot, Israel, 1973

TENDANCES DÉMOGRAPHIQUES ET DÉVELOPPEMENT INDUSTRIEL DANS UNE PERSPECTIVE HISTORIQUE *

Paul Bairoch **

LES GRANDES ÉTAPES DE MUTATION DES INTERACTIONS ENTRE MOUVEMENTS DE POPULATION ET DÉVELOPPEMENT INDUSTRIEL

1. Sur le plan historique, les relations entre les mouvements démographiques et le processus du développement industriel ont toujours été très étroites. Il s'agit là d'une des très importantes constantes des sociétés et l'interaction profonde entre ces deux phénomènes ne nécessite aucune justification en raison de la très large place qu'occupent ces deux phénomènes dans le processus du développement économique et social. Mais s'il s'agit là d'une constante, il convient d'emblée d'insister d'une part, sur les formes très différentes qu'ont revêtues les interactions entre mouvements démographiques et industrialisation [1], tant sur le plan de l'évolution historique que sur celui des différents types de sociétés, et d'autre part, sur le manque de consensus des thèses explicatives.

2. En schématisant à l'extrême, on peut considérer que trois événements (au sens large de ce terme) ont constitué d'importantes charnières qui ont modifié les modes dominants des interactions entre les mouvements démographiques et le développement industriel.

3. Premièrement, il y a ce qu'il est convenu d'appeler la révolution industrielle [2] et la révolution agricole (qui en constitue une partie intégrante) qui, en modifiant profondément le système de production agricole, ont modifié fondamentalement l'évolution démographique. Les brusques fluctuations de population disparaissent et la croissance naturelle de la population s'accélère considérablement en raison de la baisse de la mortalité, ceci pour ne rappeler que les modifications dominantes.

4. Deuxièmement, dans les années 1860-1890 se produisit presque simultanément dans le monde développé deux phénomènes importants dans le domaine démographique. En raison notamment de la baisse des prix de transport, de la libéralisation des échanges et de l'accroissement de la demande européenne, se trouvèrent réunies, à partir de 1850-1870, les conditions permettant une exploitation plus intensive des pays de peuplement européen à climat tempéré.

5. Cette possibilité jointe à une pression démographique dans certaines régions européennes entraîna le début d'un mouvement intercontinental d'émigration de masse qui atteignit son point culminant en 1913. D'autre part, vers 1870-1890, se produisit ce que l'on qualifie souvent de seconde révolution démographique : la généralisation à de très larges fractions de la population des pays occidentaux du contrôle des naissances qui conduisit à une baisse de la croissance démographique et, assez tôt, à un vieillissement de la structure de la population.

6. Troisièmement dans les années 1890-1910, et plus encore après 1930, le transfert de techniques médicales occidentales à des sociétés qui n'avaient pas connu directement la révolution industrielle entraîna une forte baisse de la mortalité sans changements notoires de la natalité. Et c'est le début de l'inflation démographique du tiers monde dont les modalités et les conséquences sont si connues.

7. C'est en tenant compte de ces importantes modifications que nous allons tenter de dégager les principales interactions entre mouvements démographiques et développement industriel et ce, dans une perspective historique. Tout naturellement nous partagerons la présente analyse en deux parties. La première, consacrée aux sociétés dites développées, couvre une période qui va, *grosso modo*, du début de l'accélération du processus d'industrialisation à la première guerre mondiale, soit environ de 1750 à 1914. Dans la seconde partie, consacrée aux pays du tiers monde, nous traiterons surtout de la période 1900-1970, mais nous tenterons également de dégager les conséquences des tendances démographiques jusqu'à la fin du siècle.

8. Ce texte se veut essentiellement un travail de première réflexion et de mise en ordre de recherches antérieures dans des domaines très proches de celui de l'objet même de ce texte. Il ne s'agit donc pas de résultats d'une recherche spécifique, ni d'une synthèse ou d'un état de la question. Pour cette raison, les références bibliographiques seront extrêmement réduites et l'essentiel des données de base sera, sauf indications contraires tiré de nos travaux antérieurs. Bref, il s'agit d'un exposé de notre point de vue sur ces problèmes mais

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[1] Bien que les termes « développement industriel » et « industrialisation » ne soient pas de véritables synonymes, on les utilisera comme tels dans ce texte.

[2] En fait, pour être complet, il faudrait parler ici des bouleversements entraînés par la révolution néolithique.

la brièveté de ce texte vu l'ampleur de la période étudiée nous obligera souvent à schématiser.

Mouvements de population et industrialisation des pays occidentaux du milieu du XVIIIe siècle à 1914

9 Ici nous examinerons successivement les rapports entre mouvements de population et industrialisation des pays développés occidentaux, sous les quatre aspects suivants : accroissement naturel de la population, urbanisation, réduction de la natalité et migrations internationales. Le problème du rôle des mouvements de la population sur les origines de la révolution industrielle anglaise ne sera pas abordé ici

Ampleur et conséquences de la phase d'accélération de la croissance démographique dans les premières phases d'industrialisation (jusqu'à 1850 environ)

10. Quelques mots d'abord sur les causes de l'accélération de la croissance démographique Il n'y a aucun doute sur le fait que, à partir du début du XIXe siècle, les progrès de la médecine ont fortement contribué à la baisse de la mortalité

11. Par contre, pour une grande partie du XVIIIe siècle, il apparaît comme très probable que c'est l'amélioration des disponibilités alimentaires et des conditions de vie en général qui a été le facteur essentiel dans la baisse de la mortalité [3]. Cette baisse de la mortalité toucha d'abord l'Angleterre vers 1740-1760 et la plupart des pays d'Europe occidentale 30 à 50 ans plus tard, selon les pays

12. Cette baisse de la mortalité, qui, généralement, amena en l'espace de 30 à 40 ans le taux brut de mortalité de quelque 35-40 p 100 à quelque 25-30 p. 100 n'ayant pas été accompagnée d'une diminution des taux de natalité a entraîné une hausse très sensible du rythme de la croissance démographique. Hausse très sensible par rapport évidemment aux taux à long terme des économies traditionnnelles. En règle générale, on peut considérer que, durant le premier demi-siècle du début de la révolution industrielle et dans les pays qui ont été les premiers à se développer, le taux annuel de croissance de la population a été de l'ordre de 0,6-0,7 p. 100. Pour les pays qui ont commencé à s'industrialiser plus tard et où, par conséquent, il y a combinaison des effets de l'accroissement du niveau de vie avec les progrès de la médecine, cette croissance démographique a été, dans les premières phases, plus rapide : de l'ordre de 0,8-1,1 p 100 Dans les pays plus précocement touchés par la révolution industrielle et surtout l'Angleterre, le plus haut niveau des ressources et, aussi, les progrès de la médecine conduisirent, dans une seconde phase, à une croissance démographique encore plus rapide, de l'ordre de 0,9-1,1 p. 100. Mais, dans certains pays, cette seconde période se place déjà dans une nouvelle phase de régimes démographiques caractérisés par une baisse de la natalité, phase qui sera analysée dans la section ci-après, (par 18 à 21) Pour l'ensemble de l'Europe, le taux de croissance démographique passe de quelque 0,2-0,3 p 100 de 1650 à 1750 à quelque 0,4-0,6 p 100 de 1750 à 1800 à 0,6 p. 100 de 1800 à 1850 et à 0,9 p. 100 de 1850 à 1910

13. A présent, si nous passons à l'analyse des rapports entre mouvements démographiques et industrialisation, il convient d'abord de noter que, pour les premières phases de la révolution industrielle en Occident, l'élément moteur ou disons déterminant des modifications de la société semble avoir été plutôt du côté de l'industrialisation que du côté des mouvements démographiques. Mais une fois les modifications introduites dans le processus démographique ceci a évidemment entraîné des conséquences sur l'industrialisation [4].

14. Nous allons examiner celles-ci en traitant tout d'abord des conséquences certaines, ensuite des probables [5]

15 Du côté des conséquences certaines de l'accélération démographique sur l'industrialisation il faut d'abord citer l'accroissement rapide de la population active et l'accentuation de l'exode rural La combinaison de ces deux facteurs a conduit à une très nette augmentation de l'offre de la main-d'œuvre dans les secteurs non agricoles. Cet accroissement de l'offre a certainement facilité le début du processus d'industrialisation, car il a précipité la rupture des entraves institutionnelles (corporations, notamment) et surtout favorisé très largement les entrepreneurs. En effet, l'accroissement rapide de l'offre de la main-d'œuvre a permis aux entrepreneurs de ne point allouer aux ouvriers une part des profits résultant des augmentations de la productivité, ce qui a favorisé les taux de profits industriels et, de ce fait, une accélération de la formation du capital dans ce secteur.

16 Pour ce qui a trait à la demande des produits industriels, il est également certain que l'augmentation rapide de la population a permis un accroissement de la demande globale, même si, comme cela a été le cas, le pouvoir d'achat des ouvriers de l'industrie ne s'est accru que très faiblement ou a régressé durant certaines phases et dans certains pays.

17. *En ce qui concerne les conséquences probables,* il faut parler surtout des conséquences de l'emploi des

[3] Pour de brèves synthèses de l'état récent de la question entre population et développement économique au XVIIIe et XIXe siècle, voir M Drake, *Population in Industrialization*, Londres, Methuen, 1969, editor's introduction; M W. Flinn, *British Population Growth 1700-1850*, Londres, 1970, D V. Glass and D E C. Eversley, *Population in History*, Londres, E. Arnold, 1965, introduction

[4] [illegible] lyse [illegible] ce [illegible] pour [illegible] *Rat*[illegible] Pre[illegible] tions of population growth".

[5] Dans cette section nous négligerons l'exposé des conséquences bien connues des modifications des mouvements naturels sur la structure en âge de la population Cet aspect sera analysé pour la période d'après 1850 dans la section ci-après (par 22 à 26).

TABLEAU 1. TAUX ANNUELS DE CROISSANCE DE LA POPULATION TOTALE DE QUELQUES PAYS OCCIDENTAUX AVANT ET DURANT LEURS PREMIÈRES PHASES D'INDUSTRIALISATION

Pays	Période précédant l'industrialisation		Première période de l'industrialisation (50 années)		Seconde période de l'industrialisation (de 30 à 50 années)	
	Période concernée	Taux annuel (p. 100)	Période concernée	Taux annuel (p. 100)	Période concernée	Taux annuel (p. 100)
Pays à industrialisation précoce						
Angleterre	1600-1740	0,1-0,2	1740-1790	0,6-0,7	1790-1840	1,3
Belgique	1700-1780	0,5-0,7	1780-1830	0,6-0,8	1830-1880	0,8
France	1700-1780	0,1-0,2	1780-1830	0,5-0,6	1830-1880	0,3
Suisse	1700-1800	0,3-0,4	1800-1850	0,6-0,8	1850-1900	0,7
Pays à industrialisation plus tardive						
Allemagne	1700-1830	0,6-0,8[a]	1830-1880	0,8	1880-1913	1,2
Danemark[b]	1700-1800	0,2-0,3	1870-1920	1,4	—	
Pays-Bas[b]	1700-1800	0,1-0,2	1860-1910	1,1	—	
Suède	1720-1810	0,5-0,6	1840-1890	0,8	1890-1920	0,7

SOURCES. — Calculés d'après les données des divers recensements et estimations reprises dans : *Annuaire démographique des Nations Unies, 1952* (publication des Nations Unies, numéro de vente : E/F 1953.XIII.1); C. Cipolla, *The Fontana Eco omic History of Europe*, Londres, 1972, vol. 2; R. Mols, *Population in Europe 1500-1700*, Londres, 1973, vol. 3; A. Armengaud, *Population in Europe 1700-1914*, Londres, 1973, vol. 3; W. R. Reinhard, A. Armengaud et J. Dupaquier, *Histoire générale de la population mondiale*, Paris, Editions Montchrestien, 1968.

NOTE. — Il convient de considérer ces périodes comme très approximatives et en partie arbitraires, car choisies également en raison des disponibilités statistiques.

[a] En grande partie phénomène de rattrapage : la guerre de Trente Ans (1618-1648) et ses conséquences indirectes ayant entraîné une chute d'environ un tiers de la population; le niveau atteint vers 1700 était encore nettement inférieur à celui de 1618.

[b] Pays à faible degré d'industrialisation mais intégrés dès avant le début du XIX[e] siècle dans le réseau des échanges avec l'Angleterre, et ayant atteint, à la fin du XIX[e] siècle, un niveau élevé de développement.

enfants. L'emploi des enfants dans les manufactures (un des scandales de la révolution industrielle) a très probablement facilité le processus d'industrialisation, car ceux-ci suppléaient à peu de frais au manque d'automatisme des machines. Or, on peut considérer que l'accroissement de l'offre de la main-d'œuvre résulte des conséquences directes et indirectes de la progression démographique de cette période. Directement par le fait même de l'accroissement rapide de cette classe d'âge, indirectement en raison des besoins financiers accrus que représentait pour les ménages ouvriers la présence d'une famille plus nombreuse à un moment où les salaires réels des ouvriers étaient encore extrêmement faibles et très proches du minimum vital, même dans le cas d'une famille de très petite taille.

Urbanisation et industrialisation

18. Si, incontestablement, l'urbanisation [6] n'est pas un processus nouveau et propre à la révolution industrielle, l'accélération de ce processus et donc, très vite, le niveau d'urbanisation des sociétés sont eux des phénomènes spécifiques et nouveaux pour les sociétés occidentales. De même, la forme de l'urbanisation — création d'un grand nombre de nouvelles agglomérations urbaines, leur croissance ainsi que la croissance des anciens centres urbains — est liée plus directement à l'industrialisation. Le tableau 2 nous permettra de saisir les bouleversements intérieurs dans le processus d'urbanisation en Europe surtout durant le XIX[e] siècle.

TABLEAU 2. INDICATEURS DU PROCESSUS D'URBANISATION DE L'EUROPE [a]

	Taux de population urbaine [b]	Nombre de villes de plus de 100 000 h. Répartition par taille				
		Total	100 000 à 200 000	200 000 à 500 000	500 000 à 1 000 000	plus de 1 000 000
1600	(4-6)	12	10	2	—	—
1700	(5-6)	12	9	3	—	—
1800	8	20	15	3	1	1
1850	12	44	29	13	—	2
1900	28	129	68	46	11	4
1910	31	155	84	47	20	4

SOURCES. — Calculs de l'auteur d'après : R. Mols, *Introduction à la démographie historique des villes d'Europe du XIV[e] au XVIII[e] siècle*, Louvain, 1954-1956; G. Sundbarg, *Aperçus statistiques internationaux*, Stockholm, P. A. Norstedt et Sôner, 1908; A. F. Weber, *The growth of cities in the nineteenth century: a study in statistics*, New York, 1899; *Annuaire Statistique de la France* (partie rétrospective), Paris, Institut national de la statistique et des études économiques.

[a] Europe : Russie et Turquie d'Europe exclues.

[b] Défini comme pourcentage de la population totale habitant les agglomérations de 20 000 habitants et plus.

19. La définition assez restrictive de l'urbanisation adoptée pour des raisons statistiques [7] dans le tableau 2

[6] Dans ce texte le terme « urbanisation » est et sera toujours employé uniquement dans son acceptation de géographie urbaine, c'est-à-dire d'importance absolue ou relative de population habitant des agglomérations urbaines et non dans son acceptation architecturale.

[7] Motivée d'une part par le fait qu'il s'agit de la définition adoptée dans les récentes études des Nations Unies et d'autre part par le fait que dans la classe inférieure les critères nationaux d'agglomération urbaine sont très différents d'un pays à un autre.

(à savoir la population habitant des agglomérations ...

définition restrictive, la population urbaine d'Europe représente 31 p. 100 de sa population totale, alors que si l'on employait comme définition de population urbaine celle utilisée par la majorité des pays (à savoir plus de 2 000 habitants), le taux serait supérieur à 50 p 100. Mais la rapidité du phénomène ressort très bien du tableau 2 et notamment le développement extrêmement rapide des grandes villes.

20. Dans le domaine des rapports entre urbanisation et industrialisation dans les pays développés au XIX[e] siècle, on peut considérer, en schématisant, que c'est l'industrialisation qui a été le facteur déterminant Certes, l'accroissement du taux de progression démographique a favorisé l'exode rural, cependant on peut être assez affirmatif et dire que l'essentiel du processus d'urbanisation a été très directement causé par le phénomène d'industrialisation. Mais, par le jeu des interactions, on peut également considérer que l'urbanisation a favorisé, à son tour, l'industrialisation à la fois par les modifications des structures de consommation et par les possibilités offertes à l'industrie dans le domaine de la concentration des débouchés et de l'offre de la main-d'œuvre.

21. De même, mais sur un plan beaucoup plus général et aussi moins certain, rappelons que, dans la mesure où on lie très souvent l'urbanisation à l'accélération de la modernisation des sociétés et surtout à un accroissement de la propension à innover (notamment en matière technique), le phénomène de forte croissance urbaine a dû constituer un facteur favorable à l'industrialisation. En ce domaine, notons que si la relation entre urbanisation et esprit d'innovation technique semble assez bien prouvée [8], il convient toutefois d'émettre une réserve importante. Il apparaîtrait qu'un niveau relativement élevé d'urbanisation avant ou durant les toutes premières phases d'industrialisation constituerait un facteur plutôt négatif. Vers 1800-1850 des pays ayant de forts taux d'urbanisation, tels que l'Italie, l'Espagne, les Pays-Bas, et la Grèce, ont connu très manifestement une industrialisation très lente et peu avancée, alors que des pays peu urbanisés, tels que l'Allemagne, la Belgique, la Suède et la Suisse, ont connu une industrialisation rapide et poussée. Somme toute on peut retrouver pour certains pays européens des problèmes voisins de ceux de l'hyperurbanisation du tiers monde (voir ci-après par. 46 à 53)

Phase de réduction de la natalité et industrialisation

22. Rappelons qu'en raison d'une généralisation d·

industrialisés et urbanisés que les autres. Pour les pay précocement industrialisés on est passé d'un taux d natalité de l'ordre de 35 p 100 avant 1840 à 26-27 p 10 pour 1901-1910, le début de ce mouvement accéléré d baisse se plaçant vers 1870-1880. Pour les pays plu tardivement industrialisés et pour les autres pay d'O...

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vers 1880-1890 Ces fortes diminutions de la natalité n'ont pas entraîné, comme nous l'avons vu dans la section ci-dessus (par 10 à 17), une réduction du taux de croissance démographique, au contraire, car, comme la mortalité a baissé dans des proportions encore plus

23 Néanmoins cette phase a eu une conséquence importante, celle d'entraîner un vieillissement de la population (voir tableau 3). Le niveau et le rythme de ce vieillissement sont très variables selon les pays. Mais, dans pratiquement tous les pays, ils sont assez nets, sans atteindre toutefois les proportions de la période d'après la première guerre mondiale où le processus s'est précipité en raison de la combinaison de la poursuite de la baisse de la fécondité et des effets de la guerre. Ce vieillissement de la population des pays développés — dont la première accélération se place vers 1850-1860 — est cependant accompagné d'un accroissement de l'importance relative du groupe d'âge de 15 à 60 ans; c'est-à-dire, *grosso modo*, de l'importance relative de la population active et aussi d'une diminution de l'importance relative de la classe d'âge de 5 à 15 ans

TABLEAU 3. INDICATEURS DU VIEILLISSEMENT DE LA POPULATION (pourcentages de population âgée de plus de 60 ans par rapport à celle âgée de moins de 15 ans)

Pays	*1860*	*1880*	*1900*	*1910*	*1930* [a]
Allemagne	17,7 [b]	22,2	22,4	23,1	45,7
Angleterre	20,8	20,2	22,8	26,2	48,5
Autriche	18,2	22,4	23,6	23,8	49,4
Belgique	29,1	29,2	29,9	30,8	51,3
Danemark	24,1	28,9	29,1	30,2	39,3
Etats-Unis	10,6	14,8	18,6	21,6	28 8
France	40,0	45,6	47,6	45,8	60,9
Pays-Bas	24,6	24,6	26,6	26 0	30,8
Suède	24,4	28,8	36,7	37,6	51,5
Suisse	28,4	27,8	30,0	28,3	43,8

SOURCES — d'après ...

[b] Vers 1870

[8] Voir notamment ... States inve... *History*, ... ciology of ... inventivene... vol 79 (n ... ferences in inventive activity and their determinants", dans *The Rate and Direction of Inventive Activity*, édition revue par R R. Nelson, Princeton, 1962

24. Les relations entre cette évolution démographique et le processus d'industrialisation sont assez complexes et ont été, dans l'ensemble, peu analysées. Ici, nous nous contenterons de mettre en relief quelques possibilités d'interactions. Dans quelle mesure est-il possible de lier la baisse de la natalité à la disparition progressive du travail des enfants du fait du renforcement des législations sociales en la matière et de la généralisation des systèmes obligatoires d'enseignement primaire [9] ? Quel que soit l'élément moteur, la disparition progressive de la main-d'œuvre enfantine a dû entraîner un effort d'innovation dans le sens d'une mécanisation plus poussée des processus de fabrication en raison de l'accroissement du coût de la main-d'œuvre qui en résultait.

25. Par contre, le vieillissement de la population pourrait impliquer une tendance à la diminution de l'innovation et, par là, un ralentissement de la croissance. A ce propos, notons que, sur le plan régional, la liaison entre vieillissement et ralentissement de la croissance n'apparaît nullement comme certaine. Ainsi, la Suède — dont, vers 1900, la population était une des plus vieilles d'Europe est le pays dont la croissance économique et l'industrialisation ont été les plus rapides, précisément de 1890 à 1910. Notons que, en raison des multiples facteurs en cause, il aurait été surprenant de trouver une très bonne corrélation entre la croissance économique et la structure en âge de la population et ce d'autant plus qu'il s'agit d'une période où le vieillissement de la population n'est pas encore très prononcé, même pour des pays tels que la Suède et la France.

26. L'accroissement rapide de l'importance absolue [10] et aussi relative de la population active adulte a dû constituer un facteur assez favorable à l'industrialisation. Mais nous rejoignons là le facteur déjà analysé précédemment. Toutefois, pour la fin du XIXe siècle et le début du XXe siècle, on peut se poser la question de savoir si, en raison de l'accélération de la croissance démographique, le rythme d'accroissement de l'offre de la main-d'œuvre ne devint pas trop rapide et n'implique pas un réel danger de déséquilibre. Nous reviendrons brièvement sur cet aspect dans la section ci-après.

Mouvements migratoires internationaux et industrialisation

27. Comme nous l'avons noté dans l'introduction générale, vers 1850-1870, en raison surtout de la conjonction de trois facteurs (baisse des prix de transport, libéralisation des échanges et augmentation de la demande européenne) se trouvèrent réunies les conditions permettant une exploitation plus intensive des pays de peuplement européen à climat tempéré. A ce phénomène d'attraction, il faut encore joindre un phénomène de répulsion qui réside, quant à lui, dans la rapide progression démographique et surtout dans certains déséquilibres régionaux entre croissance démographique favorisée par la médecine moderne et croissance économique plus lente et surtout industrialisation moins poussée.

28. Le vaste transfert de facteurs de production entre l'Europe et ces pays, et notamment les Etats-Unis, débute réellement vers 1840 et s'accélère au fur et à mesure qu'on se rapproche de la première guerre mondiale. Nous laisserons de côté les flux de capitaux, qui lui sont liés en partie, pour nous concentrer sur celui des hommes.

29. Alors que, de 1800 à 1840, on peut estimer que seulement quelque 800 000 Européens ont émigré outre-mer, plus de 1,8 million le firent durant la seule décennie 1841-1850 [11]. Au total, de 1800 à 1914, quelque 42 millions d'Européens ont émigré outre-mer, dont 41 millions de 1840 à 1913. Certes, comme a trop tendance à l'oublier, une fraction significative de ces émigrants est revenue vers l'Europe. Les taux de retour ne sont connus que pour une fraction de pays et une fraction de cette période; mais ils peuvent être estimés à quelque 40 p. 100 en moyenne [12]. Donc, le solde migratoire net n'a été que de l'ordre de 25 millions d'habitants de 1840 à 1914. Ce qui implique pour l'Europe une perte probable de population, si l'on tient compte du mouvement naturel de la population migrante, de l'ordre de 10 p. 100 vers 1913; et un gain probable de l'ordre de 40 p. 100 pour les pays de peuplement européen [13]. Pour la période 1900-1913, pendant laquelle la progression démographique européenne commença à prendre un caractère inflatoire, cette émigration a contribué à la réduire sensiblement, faisant passer le taux annuel de croissance de la population de 1,3 à 1,1 p. 100, avec très probablement une différence encore plus forte au niveau de la population active. D'autre part, comme nous l'avons noté, c'est dans le domaine des déséquilibres régionaux que cette

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[9] Voici quelques dates d'instauration de l'enseignement primaire dans des pays occidentaux : Angleterre, 1880; Italie, 1877; France, 1882; Norvège, 1889; Portugal, 1890; Espagne, 1909; Belgique, 1914.

[10] A titre d'illustration, voici l'accroissement (en pourcentage) du nombre d'hommes âgés de 15 à 60 ans entre 1870 et 1910 :

Angleterre	72	Suède	31
Allemagne	92	France	9
Autriche	35	Suisse	45
Belgique	56	Italie	18
Danemark	47		

[11] Voici l'évolution approximative du nombre d'émigrants européens (émigration intercontinentale) en millions de personnes par périodes considérées :

1841-1850	1,3	1881-1890	7,8
1851-1860	2,2	1891-1900	6,8
1861-1870	2,8	1901-1910	11,3
1871-1880	3,2	1911-1915	6,7

SOURCES. — *1841-1850 et 1911-1915* : estimations d'après les données de I. Ferenczi et W. F. Willcox, *International Migrations*, New-York, National Bureau of Economic Research, 1929, vol. I; 1851-1910, W. Woodruff, *Europe's Role in the World Economy, 1750-1960*, New-York, 1966.

[12] Plus faibles que ce taux pour les Etats-Unis, mais plus importants pour la plupart des autres pays.

[13] En raison de la structure en âge de la population émigrée et des tendances démographiques dans les pays d'installation, nous avons postulé pour cette population un taux de croissance démographique de l'ordre de 3 p. 100 par an pendant les 20 premières années et de 1,5 p. 100 pendant les autres années.

émigration a joué le rôle le plus important, réduisant sensiblement le sous-emploi [14].

30. Mais plus importantes encore ont été les conséquences de ce développement des pays de peuplement européen sur la répartition internationale du travail et, de ce fait, sur l'industrialisation. Très grossièrement, sans toutefois trop déformer la réalité, on peut considérer que ce développement a constitué le transfert vers les pays de peuplement européen, largement dotés en facteur terre, d'une partie significative de la production agricole européenne, dont les importations étaient payées par des produits industriels. Dans la mesure où la productivité agricole était très supérieure dans ces pays de peuplement européen, cette division internationale du travail a entraîné pour l'ensemble de ces deux régions considérées comme un tout, sinon une accélération du processus d'industrialisation, du moins une accélération du transfert de la population active du *primaire vers le secondaire et le tertiaire*.

31. La période de 1880-1910/20, (voir tableau 4) et très probablement la période 1870-1910, sont marquées par une accélération assez vive de la réduction de l'importance relative de l'emploi dans l'agriculture au profit de l'industrie, mais aussi du tertiaire D'ailleurs c'est dans la branche des transports que l'emploi s'est accru le plus rapidement, cet accroissement étant la résultante notamment de cette nouvelle distribution internationale du travail.

TABLEAU 4. RÉPARTITION DE LA POPULATION ACTIVE PAR BRANCHE D'ACTIVITÉ DES PAYS DÉVELOPPÉS
(pourcentage par rapport à la population active totale)

	1880	*1900*	*1920*
Agriculture	56,2	48,1	39,9
Industries extractives	1,7	2,4	2,8
Industries manufacturières	18,8	22,0	24,5
Construction	3,6	4,3	4,0
Commerce, banques, etc	5,0	6,9	9,6
Transports	2,8	4,1	5,8
Services	11,7	12,3	13,5
Population active totale	100,0	100,0	100,0

plique nullement une marge d'erreur correspondante

32 Cependant, sur le plan de la croissance économique et aussi sur celui du secteur industriel, cette redistribution internationale du travail n'a pas eu des conséquences favorables dans toutes les régions. En Europe continentale notamment, en raison de l'importance relativement grande du secteur agricole, l'arrivée massive de céréales à bas prix a fortement déprécié le pouvoir d'achat des agriculteurs, réduisant la demande totale et, par conséquent, industrielle [15]. Les années 1870-1890 ont été marquées notamment par un ralentissement de la croissance économique dans la plupart des pays européens, alors que la croissance économique a été rapide dans les pays de peuplement européen

MOUVEMENTS DE POPULATION ET INDUSTRIALISATION DES PAYS EN VOIE DE DÉVELOPPEMENT [16] DEPUIS 1900

33. Il est banal, mais non superflu, de rappeler que le rythme actuel de la croissance démographique des pays en voie de développement est un phénomène unique dans l'histoire de l'humanité A l'exception des pays d'immigration massive, la croissance naturelle des pays développés a atteint un maximum de l'ordre de 1,2 p 100 et cela se passait vers 1890-1913, c'est-à-dire à un moment où leur industrialisation était déjà fort avancée. Pour les pays en voie de développement, le taux de croissance a dépassé le 1 p 100 dès les années 1920, les 2 p 100 dès les années 1950, et se situe vers les 2,6 p. 100 actuellement, il sera au moins de cet ordre au cours des vingt prochaines années Autrement dit, de 1950 à 1980, la population du tiers monde aura augmenté en terme relatif autant que la population européenne ne l'a fait entre 1750 et 1870 [17].

34. Il est également banal, mais également non superflu, d'insister sur le fait que traiter du tiers monde dans son ensemble est commettre une grossière généralisation, les structures économiques et sociales étant très différentes dans chacune des grandes régions qui composent cette entité, sans descendre au niveau des 170 entités politiques qui le composent Mais, dans le cadre de ce texte, une telle généralisation est nécessaire

35. Dans cette partie nous nous attacherons surtout

première section, nous traiterons des rapports entre croissance naturelle et industrialisation sur un plan plus général.

Croissance démographique et industrialisation

36. Il est impossible d'analyser objectivement les problèmes d'industrialisation des pays en voie de développement sans insister sur le phénomène de colonisation qui a concerné une très forte proportion de ces

[15] Voir notamment nos articles « Commerce extérieur et

données statistiques pour les pays en voie de développement à économie planifiée et aussi de la problématique différente que représente l'industrialisation de ces , avons été amené à les exclure de la anal

[17] Ou de 1880 à 1960.

pays et ce jusqu'aux années 1950-1960. L'absence d'indépendance politique impliquant, entre autres entraves, une absence de protection douanière dans le domaine des importations d'articles manufacturés. Pour nous en tenir à la période analysée ici, notons que, de 1900 à la fin de la seconde guerre mondiale, la protection douanière a été considérablement plus forte dans les pays développés que dans les pays en voie de développement. Dans les pays développés, pourtant beaucoup mieux armés pour résister à la concurrence des importations de produits manufacturés, les droits de douane pour ces articles se situaient en moyenne entre 20 et 40 p. 100. Par contre, dans les pays du tiers monde non indépendants politiquement, les importations de produits manufacturés étaient généralement libres, notamment celles en provenance de la métropole, ou étaient grevées de droits de douane de l'ordre de 3 à 6 p. 100.

37. Dès lors, il était naturel que le processus de *désindustrialisation* — qui, pendant le XIXe siècle, a marqué les pays du tiers monde — se soit poursuivi jusque vers 1950 (voir tableau 5). Une fraction importante de l'Amérique latine (et notamment l'Argentine et le Brésil) échappa à cette évolution et son processus d'industrialisation s'accéléra surtout pendant les deux guerres mondiales en raison justement d'un adoucissement de la concurrence internationale. Mais, pour l'Asie du Sud et de l'Est [18], l'industrie manufacturière, qui occupait 9,9 p. 100 de la population active en 1900, *n'en occupait plus que 9,2 p. 100 en 1930* et 7,3 p. 100 en 1950.

38. Pour ces raisons, l'analyse des rapports entre progression démographique et industrialisation est pratiquement sans objet pour la période 1900-1950. Après 1950, le phénomène se renverse et l'on assiste, dans la plupart des régions du tiers monde, à une croissance très rapide de la production industrielle.

[18] Rappelons que, en raison surtout de l'absence de statistiques, les pays en voie de développement à économie planifiée ne sont pas inclus dans cette analyse.

39. De 1950 à 1970, le taux annuel de de la production de l'industrie manufacturiè l'ordre de 6,5 p. 100, ce qui, malgré les pr productivité, a fait passer l'emploi dans ce quelque 32 millions d'actifs en 1950 à 46 1960 et environ à 70 millions en 1970; ou relatif, de 7,6 p. 100 de la population activ 1950 à quelque 10 p. 100 en 1970.

40. Quelles relations peut-on entrevoir *industrialisation récente* et la croissance phique? Celles-ci apparaissent comme éta *négatives*. Les conséquences favorables de démographique sont peu nombreuses et d' *réduit*, alors que les conséquences négative importantes.

41. Au niveau des conséquences favorabl vient de signaler que l'accroissement de la par le biais de l'augmentation de la popula jouer un rôle plutôt restreint, étant donn processus d'industrialisation s'est fait jusqu' grâce à la substitution de la production l importations. D'autre part, malgré la croissa de la production industrielle le secteur de manufacturière n'a pu absorber qu'une t fraction du surplus de la population active rur si nous examinons l'évolution entre 1950 et pays en voie de développement à économie d nous pouvons estimer, en nous basant sur les des mouvements démographiques, que la p active rurale s'est accrue entre ces deux dates 81 millions de personnes. Or, durant la mêm l'emploi dans l'industrie manufacturière n'a que de 14 millions d'unités, mais la populati de ce secteur a enregistré, en raison des mo naturels, un accroissement de l'ordre de 7 Même en postulant (très arbitrairement) qu de l'accroissement naturel de la population l'industrie soit passé dans le tertiaire, on a conclusion que le développement de l'emploi dustrie manufacturière n'a permis d'absorber q 10 p. 100 du surplus de la population acti

TABLEAU 5. EVOLUTION DE LA STRUCTURE PAR BRANCHES D'ACTIVITÉ DE LA POPULATION DES PAYS EN VOIE DE DÉVELOPPEMENT À ÉCONOMIE DE MARCHÉ
(en pourcentage de la population active totale)

	1900	*1920*	*1930*	*1950*	*1960*	*1970* [a]
Agriculture	77,9	77,6	76,6	73,3	70,7	65,0
Industries extractives		0,4	0,4	0,6	0,6	
Industries manufacturières	9,8	8,5	8,5	7,6	8,9	13,0
Construction		1,0	1,1	1,8	2,0	
Commerce, banques, etc.		5,4	5,4	5,8	5,9	
Transports, communications	12,3	1,6	1,8	2,0	2,2	22,0
Services		5,5	6,1	8,9	9,6	
Population active totale	100,0	100,0	100,0	100,0	100,0	100,0

SOURCES : d'après P. Bairoch : « La structure de la population active du tiers monde, 1900-1970 » dans *Tiers monde,* Paris, tome X, nº 38 (avril-juin 1969).

NOTE. — Le faible degré d'arrondissement des chiffres n'implique nullement une marge d'erreur correspondante.

[a] Données provisoires.

Ce taux, très modeste, constitue cependant déjà un progrès par rapport à l'évolution enregistrée dans ce domaine entre 1920 et 1950. Durant ces trente années, le développement de l'emploi dans l'industrie manufacturière a été tellement modéré que celle-ci n'a même pas été capable d'absorber l'accroissement naturel de la population active travaillant dans ce secteur. En fait, l'augmentation de l'emploi a correspondu à environ la moitié seulement de l'accroissement naturel des actifs Cela a dû contribuer largement à l'hypertrophie du secteur tertiaire, quoiqu'une fraction de ces actifs ait dû être absorbée par l'augmentation plus rapide des emplois dans l'industrie extractive et, surtout, dans la construction Le même calcul effectué pour la période 1960-1970 (mais les données sont plus provisoires) permet d'aboutir à la conclusion que, durant ces dix années, de 11 à 13 p 100 environ du surplus de la population active rurale ont été épongés par le développement de l'emploi dans l'industrie manufacturière

42. Nous avons réalisé des calculs similaires pour des pays européens durant les vingt premières années pour lesquelles on dispose de recensements de la population active relativement valables (généralement 1840/1850-1860/1870). Ceux-ci nous ont fourni un taux d'épongeage de l'ordre de 40 à plus de 100 p. 100, avec une moyenne se situant vers les 50 p. 100. Pour l'ensemble de l'Europe anciennement industrialisée [19], entre 1880 et 1900 ce taux a été de l'ordre de 80 p. 100.

43. Mais, en 1880, cette région n'avait plus que 46 p. 100 de sa population active dans l'agriculture. Sur la base des données ci-dessus, on peut estimer à environ 30-40 p. 100 le taux d'épongeage lors des toutes premières phases de l'industrialisation pour les pays actuellement développés.

44. La différence entre ces taux et ceux enregistrés actuellement par le tiers monde ne résulte cependant pas d'une expansion plus rapide de l'industrie manufacturière des pays développés (au contraire, les taux de croissance de la production industrielle des pays en voie de développement sont, actuellement, plus élevés que ceux des pays développés au cours du XIX[e] siècle), mais résulte essentiellement des différences dans les taux de progression démographique. D'ailleurs, si l'on fait un calcul théorique du niveau de ce taux entre 1950 et 1960 pour le tiers monde, dans l'hypothèse d'une progression de la population de 0,6 p 100 par an et en partant de la structure des activités de 1950 et en postulant un accroissement de la production et de la productivité du même ordre que celui qui a eu lieu entre 1949/1951 et 1959/1961, on obtient alors un taux d'épongeage de 70 p 100.

45. Au niveau des conséquences plus nettement défavorables, il convient d'insister sur le rôle très négatif qu'a joué l'inflation démographique dans le secteur agricole. En raison des possibilités restreintes d'accroître à faible coût les surfaces cultivables, de 1900 à 1970 la superficie agricole par actif occupé dans l'agriculture a diminué dans les proportions de 2 à 1. De ce fait, on a assisté à une régression ou, au mieux, à une stagnation de la productivité de ce secteur [20]. Une telle évolution a certainement été favorable à l'industrialisation, ne serait-ce qu'en raison de l'importance relative de la demande en provenance des populations rurales qui, malgré l'exode vers les villes (voir plus loin), représentent encore plus des deux tiers de la population totale (plus de 80 p 100) en Asie et en Afrique, mais seulement 60 p 100 en Amérique latine)

Inflation démographique, exode rural, hyperurbanisation et industrialisation

46 Bien que d'autres facteurs, tels que le fort écart entre revenus urbains et ruraux, l'élévation rapide du niveau d'éducation et l'attraction inhérente au mode de vie urbaine (accentuée par les progrès des communications), soient intervenus très largement, il n'y a aucun doute que l'inflation démographique soit la principale cause, directe, ou indirecte, de l'exode rural qui a pris des proportions inconnues jusqu'ici [21] La population urbaine [22] de l'ensemble des pays en voie de développement (sans les pays à économie planifiée) est passée de quelque 42 millions d'habitants en 1900 à 97 millions en 1930 et à quelque 350 millions en 1970; elle atteindra probablement quelque 1200-1500 millions en l'an 2000

47 Alors qu'en Europe le taux annuel de croissance de la population urbaine n'a jamais dépassé en moyenne les 2 p 100, pour les pays en voie de développement à économie de marché ce taux a évolué comme suit

	Pourcentages
1900-1920	1,2
1920-1930	2,9
1930-1940	3,4
1940-1950	4,1
1950-1060	5,1
1960-1970	4,1

SOURCES. — 1920-1970, d'après *La croissance de la population* [illegible] sions du Département des affaires économiques et sociales des Nations Unies, estimation probablement sous-estimée, nous pensons qu'il s'agira d'environ 5 p 100, sinon davantage

48. Ce très rapide accroissement de la population urbaine entraîne un accroissement rapide du taux d'urbanisation. Bien que le cadre de cette étude nous

[19] Allemagne, Autriche, Belgique, Danemark, France, Italie, Luxembourg, Norvège, Pays-Bas, Suède, Suisse, Tchécoslovaquie.

[20] Voir P Bairoch, *Diagnostic de l'évolution économique du tiers monde, 1960-1968*, Paris, Gauthier-Villars, 1970, traduction anglaise élargie et mise à jour à paraître chez Methuen, Londres.

[21] Voir le chapitre 2, « Causes de l'inflation urbaine et de l'exode rural », dans P. Bairoch, *Le chômage urbai[illegible] ans les pays en voie de développement*, Genèv[illegible], 19[illegible]

[22] Définis comme la population b[illegible] ions de 20 000 habitants et plus

oblige à négliger les différences régionales, il nous faut ici faire une exception, car il s'agit d'un domaine où ces différences sont peut-être les plus accusées. Pour des raison historiques, le taux d'urbanisation de l'Amérique latine est élevé dès le début de ce siècle et, même actuellement et malgré un certain rattrapage des autres régions, l'écart reste encore très important.

49. Contrairement à ce qui s'est passé dans les pays occidentaux durant le XIX[e] siècle et une grande partie de ce XX[e] siècle, l'urbanisation rapide du tiers monde n'a pas été la résultante d'un processus d'industrialisation.

50. Comme nous l'avons vu, jusqu'en 1950 on a même noté une désindustrialisation des pays du tiers monde; or, cette désindustrialisation s'est accompagnée d'un progrès très rapide de l'urbanisation.

51. D'ailleurs il est significatif qu'en Europe le taux d'urbanisation soit resté inférieur au pourcentage de population active dans l'industrie manufacturière jusqu'en 1890 environ, c'est-à-dire à un moment où le pourcentage des actifs occupés dans l'industrie manufacturière dépassait 18 p. 100. Ce n'est qu'à partir de cette période que le taux d'urbanisation a dépassé celui de l'industrie manufacturière et, progressivement, l'écart entre ces deux taux s'est élargi (étant proche de 100 p. 100 actuellement). Or, dans les pays en voie de développement (voir tableau 6), ce stade a été franchi à un moment où le pourcentage d'actifs dans l'industrie manufacturière était inférieur à 9 p. 100 (entre 1930 et 1940). Et, en moins de trente ans, l'écart entre ces deux taux a atteint 100 p. 100 (en Europe cette évolution a pris plus de quatre-vingts ans). En 1960, le taux d'urbanisation des pays en voie de développement était celui de l'Europe (moins l'Angleterre de 1880-1885 (à ce moment celle-ci avait un pourcentage de population active occupée dans l'industrie manufacturière deux fois supérieur à celui des pays en voie de développement).

52. Donc il s'agit d'une évolution très différente [23]; et, de ce fait, cette urbanisation rapide — qu'on a, à juste titre, qualifié d'hyperurbanisation a entraîné un problème dont, auparavant, l'ampleur était inconnue : un très grand déséquilibre en milieu urbain entre l'offre et la demande de main-d'œuvre. Ce déséquilibre s'est traduit par une hypertrophie du tertiaire, un sous-emploi substantiel dans un grand nombre de secteurs et, surtout, un chômage urbain qui atteint des taux extrêmement élevés dans un grand nombre de pays en voie de développement. A ce chômage élevé nous proposons d'appliquer le terme de «surchômage urbain», que l'on peut définir comme une situation caractérisée par un haut niveau de chômage structurel résultant d'un déséquilibre entre l'offre et la demande d'emplois, déséquilibre occasionné surtout par un affux massif d'actifs rejetés par le milieu rural. Ce "surchômage urbain"

TABLEAU 6. COMPARAISON DES NIVEAUX D'URBANISATION ET DES POURCENTAGES DE POPULATION ACTIVE OCCUPÉE DANS L'INDUSTRIE MANUFACTURIÈRE

(Pourcentages [a])

		Taux de population urbaine (1)	*Pourcentages de population active dans l'industrie manufacturière (2)*	*Ecarts de (1) par rapport à (2) (3)*
Europe (moins l'Angleterre et la Russie)				
	1800	7,0	11,0	– 55
	1850	11,0	16,0	– 30
	1880	16,0	18,0	– 10
	1900	24,0	20,0	+ 20
	1920	29,0	21,0	+ 40
	1930	32,0	22,0	+ 45
Pays en voie de développement à économie de marché				
	1900 ...	5,9	9,0	– 35
	1920	6,7	8,5	– 20
	1930	7,8	8,5	– 10
	1940	9,7	8,0	+ 20
	1950	12,9	7,5	+ 70
	1960 ...	16,7	9,0	+ 85
	1970	19,7[b]	10,0	+100
	1970	21,0[c]	10,0	+110
Afrique	1960 ...	13,4	7,0	+ 90
Amérique	1960	32,8	14,5	+125
Asie	1960	13,7	9,0	+ 50

SOURCES. — P. Bairoch; *Le chômage urbain dans les pays en voie de développement*, Genève, BIT, 1972.

[a] Arrondis à l'unité près pour les taux de population urbaine et les pourcentages de population active de l'Europe; à la demi-unité pour les pourcentages de population active des pays en voie de développement et à 5 unités pour les écarts.

[b] Prévisions des Nations Unies.

[c] Estimations de l'auteur.

varie généralement de 10 à 20 p. 100 de la population active totale et est surtout le fait de jeunes, en particulier de jeunes à niveau moyen de scolarité. Le taux de chômage pour le groupe d'âge de 15 à 24 ans est généralement près du double de celui de l'ensemble de la population active. Sur base de données — qui, certes, sont fragmentaires mais assez concordantes — on peut fixer pour ce groupe d'âge le taux de chômage à quelque 18-35 p. 100. Très grossièrement on peut estimer que le nombre total des chômeurs urbains était, pour l'ensemble des pays en voie de développement à économie de marché, de l'ordre de 20 à 24 millions en 1970, contre 6 à 8 millions vers 1950 [24], mais selon les données fragmentaires disponibles, les taux de chômage sont restés relativement stables, avec cependant la probabilité d'une légère progression [25]. Est-il possible de considérer qu'à côté de ses conséquences très négatives sur

[23] Nous avons négligé ici l'influence du commerce extérieur d'articles manufacturés; voir à ce propos P. Bairoch, *Le chômage urbain ... op. cit.*, p. 26 et 27.

[24] Si on utilise les définitions nationales des régions urbaines, le nombre de chômeurs urbains peut être alors estimé entre 25 et 32 millions pour 1970 et 11 millions pour 1950.

[25] Pour plus de détails, voir P. Bairoch, *Le chômage urbain ... op. cit.*

le plan de l'emploi l'hyperurbanisation peut également avoir des conséquence positives ? Autrement dit, peut-on considérer que le fait urbain est un facteur favorable au développement économique et social du tiers-monde, tout comme on considère généralement que l'urbanisation des sociétés occidentales a été un facteur de modernisation et surtout d'innovation ? C'est là une grande question dans laquelle les inconnues l'emportent de très loin sur les connaissances Les travaux en ce domaine ne sont pas encore assez nombreux pour qu'on *puisse y répondre avec tant soit peu de certitude* [26]. Cependant, signalons qu'une analyse de la littérature en ce domaine fait apparaître une convergence des points de vue sur l'influence négative qu'a sur le developpement, l'urbanisation trop rapide à laquelle on assiste. Mais cette convergence ne doit pas faire oublier le courant de pensées, invoqué ci-dessus, qui voit dans la ville un facteur de modernisation et, par conséquent, d'industrialisation. De ce fait, il est plus exact de dire qu'il y a probablement unanimité sur l'influence néfaste d'une trop rapide urbanisation (ce qui laisse subsister évidemment le problème du niveau à partir duquel cette urbanisation est jugée trop rapide) Nos travaux personnels en la matière n'en sont qu'à leur commencement. Tout ce que nous pouvons dire c'est que si l'inflation urbaine, sous certaines conditions, a pu peut-être entraîner quelques retombées positives sur le plan purement économique, sur le plan social il est très probable que le bilan ne peut être que *fortement* négatif

53. Or, comme entre 1970 et l'an 2000 on peut estimer que quelque 900 à 1200 millions d'hommes viendront s'ajouter à la population de l'ordre de 350 millions que comptent aujourd'hui les agglomérations urbaines des pays en voie de développement à économie de marché, on voit qu'il s'agit d'un mouvement de population d'une ampleur jamais enregistrée auparavant. En trente ans, c'est-à-dire de 1970 à l'an 2000, la population urbaine des seuls pays en voie de développement à économie de marché va s'accroître d'un peu plus d'un milliard d'habitants Or, vers 1970, la population urbaine mondiale totale (y compris les pays développés et en voie de développement à économie planifiée) ne comptait qu'un milliard d'habitants, lequel milliard est l'aboutissement d'une évolution plusieurs fois séculaire Cette très rapide croissance de la population urbaine constituera certainement un des abcès de fixation des problèmes du sous-développement durant les prochaines décennies et dont la solution ne peut venir que d'une stratégie globale du développement Et dans cette stratégie globale du développement le facteur démographique est une des variables essentielles sur laquelle il importe de jouer le plus rapidement possible, eu égard à la lenteur des modifications en ce domaine

[26] A ce propos voir notamment . J L. Abu-Lughod, « Urbanization in Egypt . present state and future prospects, dans *Economic development and cultural change*, vol XIII, nº 3 (avril 1965); J Friedmann et T Lackington, « Hyperurban- [illegible]

[illegible]

nomic development », dans *Economic development and cultural change*, vol XIII, nº 4 (juillet 1965), T G McGee, *The* [illegible]

MAJOR ECONOMIC AND SOCIAL CORRELATES OF DEMOGRAPHIC TRENDS, 1950-1970

United Nations Secretariat *

1. The question of the relationships between population and economic and social development has become, in recent decades, a matter of prime concern. The issue of the nature and extent of these relationships became prominent with the emergence of new demographic trends in the developing countries at a time when the problems of their development came to be regarded as one of the world's major challenges. As consciousness of the low levels and impoverished conditions of living in the developing countries inspired intensified efforts to speed up their development, demographic trends revealed an unprecedented acceleration of the growth of their populations. Apprehensions about the impact of this rapid increase and the characteristics associated with it—such as the unfavourable age distribution, the high rates of urbanization and rural-to-urban migrations—on economic and social progress became widespread when the extent of the upsurge in population growth became apparent.

2. In attempting to assess the implications of these demographic trends, it is important to remember that a speeding-up of population growth in the early stages of development is to be expected. Theoretical arguments, supported by historical experience, suggest the existence of a positive link between population growth, on the one hand, and economic and social progress, on the other, in the initial phase of development. Amelioration in basic living conditions—such as food supplies and nutrition, and technological advances, including those in the fields of medicine and public health—occurring as development gets under way will improve mortality conditions in particular. To the extent that birth rates will change little in these early phases of development, the reduction in death rates will cause population growth to accelerate. Historical trends in the currently developed countries in general tend to conform to this pattern. Population growth in the majority of these countries accelerated notably in the nineteenth century as they embarked on their development. Gradual decreases in mortality caused a widening gap between births and deaths well above the long-term levels observed before then. The historical record also indicates that the acceleration of population growth need not be an insurmountable or serious obstacle to development. As a matter of fact, it is generally held that the more rapid increase of population in these countries was at the same time a condition for as well as a result of their economic growth and over-all development.

3. The acceleration of population growth, brought about by declining death rates and stable birth rates, is seen as only one phase in a broader process of demographic evolution, generally known as the demographic transition. Continued progress, according to this theory, will cause birth rates to decrease as changes in attitudes, motivations and knowledge conducive to lower fertility become more effective and acquire full force. Declining birth rates would halt and eventually reverse the trend towards increasing growth rates. As the demographic cycle is completed, population growth would be low or moderate as a balance between birth and death rates at a low level is re-established. The developing countries, however, have only relatively recently entered the stage of rapid population growth; and it is the evolution of their population trends since then which is the major source of concern.

4. Consequently, concern about the impact on development of the recent acceleration in population growth is not so much caused by the acceleration itself, which could have been and was foreseen, but about the magnitude of the increase. As a result of a very steep decline in mortality, combined with high levels of fertility, the increase in population growth rates in the developing countries in recent decades bears little comparison to the past experience of the currently developed countries. For the latter group of countries as a whole, the long-term rates of population growth were only slightly over 1.0 per cent per annum. In contrast, population growth in the developing regions was, on average, about 2.2 per cent per annum between 1950 and 1970 and reached close to 2.5 per cent in 1970.

5. In considering the implications of these demographic trends for development, one of the fundamental issues is whether the rapid growth of population will retard economic and social progress and the decline in fertility, which depends to a large degree upon development. Stated in somewhat different terms, the question is whether current rapid population growth is an obstacle to those economic and social changes which are conducive to lower population growth. A considerable volume of analytical studies does, in fact, suggest

* Population Division of the Department of Economic and Social Affairs.

that rapid population growth may, other conditions being equal, adversely affect economic growth and social development, but the precise effect under specific conditions remains a matter of considerable debate. The purpose of this paper is to bring together data on recent trends in population and some of the major economic and social developmental variables A confrontation of this type, while it cannot pretend to determine the economic and social impact of demographic trends, may be seen as a useful complement to those studies of a more analytical nature which are designed to assess such implications. More important, it may help to determine the critical areas and pressure points which require action most urgently.

6. The limitations of any attempt to assess the major economic and social correlates of population trends during recent decades should be kept in mind A major obstacle for such comparisons is the problem of the quantity and quality of data. Gaps and deficiencies in information seriously limit the scope and validity of the analyses which can be undertaken in this regard In addition, it should be recalled that comparisons for a period covering only a few decades and in various instances, due to the lack of data, even less than that, may be misleading to the extent that the economic and social implications of population trends, as a rule, manifest themselves over a longer period Despite these limitations, a comparative analysis, even at such a general level as the one proposed here, may contribute to a better insight into the problems involved.

Growth of population and income

7. The short-comings of income or product as an indicator of over-all or even economic development are recognized almost universally Nevertheless, to the extent that economic and social progress depends upon the supply of goods and services, output or income remains a basic element in the development process. Apart from the inherent short-comings of the income concept, comparison of population and income trends is seriously hampered by problems of availability, reliability, conversion and comparability of the data. Thus, because of different accounting methods, estimates for the centrally planned economies are not comparable with those of the so-called "market economies", and for this reason, the European and Asian centrally planned economies are not included in the income estimates Some of the smaller market economies also are excluded from the comparisons (see note to table 1) For the remaining countries, data for all cases were available only for the period 1960-1970

8 One immediate effect of the more rapid growth of population in the developing countries has been the

Table 1 Growth rates of population and *per capita* gross domestic product, by region, 1960-1970

(Gross domestic product in United States dollars at constant prices of 1963)

Region	Population (millions) 1960	Population (millions) 1970	Average annual rate of growth 1960-1970 (percentage) Population	Gross domestic product	Per capita gross domestic product
Market economies	*1,970.88*	*2,426 74*	*2 1*	*4 9*	*2.7*
Developed market economies [a]	631.50	702.18	1.1	4 8	3 7
Less developed market economies	1,339.36	1,729 56	2.5	5 1	2 6
Africa [b]	251.72	322.19	2.5	4.5	2 0
North America	199 00	288 00	1 4	4.1	2 7
Caribbean and Latin America	212 75	282 62	2 8	5 4	2 6
Asia—Middle East [c]	77 38	102 00	2 8	6.7	4 0
Asia—East and South-East [d]	797.12	1,017.28	2.5	4 6	2.1
Europe	308 01	331 69	0.7	4 8	4 0

Source: Population data from United Nations, *Demographic Yearbook 1971* (Sales No. E/F.72.XIII 1). Data on gross domestic product supplied by the Statistical Office of the United Nations.

Note Because of lack of data on gross domestic product, the following adjustments and exclusions from major areas were made

Africa Excluding Cape Verde Islands, French Territory of the Afars and the Issas, Guinea Bissau, Namibia, Réunion, São Tomé and Principe, South Africa and Spanish North Africa

[illegible]

Republic of Viet-Nam.

Europe Excluding Andorra, Channel Islands, Faeroe Islands, Gibraltar, Isle of Liechtenstein, San Marino, Turkey and the centrally planned

[a] Including Australia and New Zealand, Israel, Japan and South [illegible]

[b] Excluding South Africa

[c] Exluding Israel.

[d] [illegible]

relative increase of the world population living in those nations traditionally considered low-income countries. It has been estimated that between 1950 and 1970, the world's population increased from somewhat less than 2.5 thousand million to over 3.6 thousand million, or 1.9 per cent per annum. Nearly four fifths of this increase occurred in the developing regions, which experienced over this period an average annual growth rate of 2.2 per cent, nearly twice as high as that of the developed regions.[1] As a result of this differential in growth trends, the proportion of the world population that lived in the less developed, predominantly low-income, regions rose from 65.5 per cent in 1950 to 70.0 per cent in 1970.

9. The available estimates indicate that in the past decades not only population, but total product and income have increased rapidly in both developed and developing countries, and that the growth rates of total product corresponding to each of these groups of countries were very similar, despite the large differences between them in population growth. It is generally acknowledged that the post-war period has been one of rapid economic growth in both developed and developing countries. Total gross domestic product, at constant prices, of the market economies considered here increased at an average annual rate of 4.9 per cent between 1960 and 1970 (see table 1) and the available evidence indicates that during the 1950s the increase was only slightly less. Although data for earlier periods are difficult to obtain, these growth rates were well above long-term trends in the past. High rates of growth of total product were common to both developed and developing regions, notwithstanding the great differences separating them, including those in population growth. The total gross domestic product of the developed countries is estimated to have increased at 4.8 per cent per annum between 1960 and 1970, and the estimated rate for the developing countries was at 5.1 per cent, even somewhat higher. Since this relatively small difference was associated with a considerable divergence in population growth in the two groups of countries, the results would appear to provide, contrary to what is often assumed, no confirmation of the existence of a negative association between the growth of population and that of total income or product. However, it should be emphasized that inferences drawn on the basis of such a simple comparison ignore the great differences between the two groups of countries and are far from conclusive and certainly inadequate for any generalizations in this respect.

10. While economic growth in the developing countries has been substantial during the post-war period, the rate of growth of their average *per capita* income was considerably lower than in the developed countries, reflecting the differentials in population growth. With total product increasing at 5.1 and population at 2.5 per cent, *per capita* product in the developing countries expanded at a rate of 2.6 per cent per annum between 1960 and 1970. Such a rate—implying a doubling of *per capita* product in less than 27 years—is probably unprecedented in the history of these countries and cannot have been sustained for any length of time in the past. Moreover, it should be noted, such a high growth was attained in the face of an also unprecedented growth in population. On the other hand, given the similarity in growth of total product in developed and developing countries, the deflation of the growth in total product by that in population to obtain the average product per person results in a considerably slower growth of *per capita* product in the developing countries. In the developed countries, the growth of total product and population of 4.8 and 1.1 per cent, respectively, implied an increase in *per capita* product of 3.7 per cent, well above the level of the developing countries. The observation of similar trends has led at least one author to conclude that in purely statistical terms, the growing gap in *per capita* income between developed and developing countries is in part due to the more rapid growth of population in the latter. However, the purely statistical nature of such a conclusion, which ignores the question of what effect a different rate of population growth in the developing countries would have had on the growth in production, was emphasized.[2] The results, however, should not be understood to imply that higher population growth in the developing countries was a significant factor in the widening absolute gap in *per capita* income levels. In fact, in comparison with the effect of the different initial levels of *per capita* income in the two groups of countries, its influence was negligible. As long as this gap is very large and *per capita* income in the developed countries continues to expand significantly, the absolute gap in *per capita* income between the developed and the developing countries is bound to increase, irrespective of whether population in the latter is growing rapidly or slowly.

11. Comparisons of the growth of population, on the one hand, with that of total and *per capita* product, on the other, do not provide firm evidence of a close relationship between population and economic growth. In order to examine at a very general level the possible relationships between population growth and economic performance, data of 50 developing countries for the period 1960-1970 were selected (see table 2). In a number of cases, including the Asian centrally planned economies, the required data were not available and from those for which data were available some additional ones were excluded[3] in order to form a relatively

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[1] These latter regions, as defined, include all of Europe, Canada and the United States of America, Australia and New Zealand; and only in this particular case, Temperate South America and Japan. See United Nations Population Division, "Demographic trends in the world and its major regions 1950-1970", *Population Debate*, vol. I, part two.

[2] H. W. Singer, "Income distribution and population growth", *Population Debate*, vol. I, part four; paras. 3-4.

[3] Among the countries excluded were: (*a*) countries affected by major disorders or internal and external strife, which may have affected their development (such as Laos and the Republic of Viet-Nam); (*b*) the countries where development during the past decade was greatly affected by the exploitation of oil,

TABLE 2 GROWTH OF POPULATION AND TOTAL AND *per capita* GROSS DOMESTIC PRODUCT IN SELECTED DEVELOPING COUNTRIES OR AREAS, 1960-1970

(Average annual growth rates, percentage)

Country or area	Population	Gross domestic product	
		Total	Per capita
Costa Rica	3.77	6.42	2.65
Iraq	3.65	6.23	2.58
Jordan	3.44	4.97	1.54
Mexico	3.41	6.85	3.44
Syrian Arab Republic	3.32	6.39	3.08
Honduras	3.32	5.11	1.80
Philippines	3.30	4.79	1.50
Dominican Republic	3.29	3.59	0.30
Paraguay	3.29	4.59	1.31
Colombia	3.27	5.09	1.82
Ecuador	3.35	5.06	1.71
El Salvador	3.18	5.48	2.30
Panama	3.17	7.66	4.49
Thailand	3.15	7.57	4.42
Pakistan	3.10	3.92	0.82
Lebanon	2.78	4.21	1.43
Hong Kong	3.02	9.01	5.99
Morocco	3.01	3.81	0.81
Nicaragua	2.97	7.00	4.04
Kenya	2.95	5.47	2.53
Tunisia	2.95	4.97	2.02
Sudan	2.93	3.49	0.56
Guatemala	2.91	5.35	2.44
Zambia	2.88	5.99	3.11
Brazil	2.88	5.69	2.81
Ghana	2.87	2.60	−0.26
Malaysia	2.85	5.78	2.94
Turkey	2.82	5.42	2.60
Peru	3.04	5.05	2.02
Iran	2.77	8.43	5.69
Guyana	2.77	3.75	0.98
Egypt	2.71	5.63	2.78
Indonesia	2.59	3.81	1.22
Singapore	2.53	9.16	6.63
Uganda	2.50	4.01	1.52
Nigeria	2.49	2.84	0.35
India	2.48	3.66	1.18
United Republic of Tanzania	2.48	4.50	2.04
Sri Lanka	2.42	5.00	2.58
Chile	2.41	4.33	1.92
Haiti	2.34	1.09	−1.24
Bolivia	2.31	5.22	2.91
Burma	2.23	3.61	1.39
Sierra Leone	2.13	6.14	4.00
Zaire	2.09	3.21	1.12
Afghanistan	2.07	2.07	0.00
Jamaica	2.03	4.83	2.81
Ethiopia	1.91	4.53	2.64
Argentina	1.53	4.07	2.54
Uruguay	1.28	1.36	0.09

homogeneous group Comparisons of growth rates of population and *per capita* gross domestic product did not reveal a systematic trend between the two and this was confirmed when the corresponding correlation coefficient was calculated. The coefficient of correlation between the rates of growth of population and of *per capita* product was positive, but very low (0.1344) The value of the coefficient appeared not high enough to be of any significance and the assumption of no correlation between the two variables was confirmed by statistical tests (analysis of variance and F-test) Although this finding would appear to be in disagreement with the frequently made assumption that rapid population growth has a negative effect on the expansion of *per capita* income and the findings of at least one study,[4] it is corroborated by various other studies [5] The absence of a correlation between population growth and growth of *per capita* product suggests that, in general, more rapid population growth can be expected to be associated with a more rapid growth of total product This assumption is confirmed to some extent by the positive and significant correlation coefficient of 0.584 between these two variables

12 Further comparisons for the same group of developing countries, considering not only the growth of population, but its size and, in addition to the growth of *per capita* product, its level, do not provide any evidence of a systematic relationship between population and *per capita* product Using simple correlation analysis, the coefficients between population growth and level of *per capita* product, population size and the growth rate of *per capita* product and population size and the level of *per capita* product were all found to be practically nil (the respective values being −0.047, −0.146 and −0.188)

13 In general, these correlation coefficients suggest that it is not possible to infer the existence of a clear relationship between the size and growth of population and the level and growth of *per capita* product This fact, however, should not be interpreted to mean that there is no relationship at all between population and growth of *per capita* product Economic growth, it should be recalled, is the outcome of a great number of variables and the importance of each of them may vary considerably from one country to the next. The findings intimate that among the innumerable determinants of economic growth, and within the great variety of existing development contexts, population is not a factor which by itself dominates economic growth.

creating special conditions (Kuwait, Libyan Arab Republic, Saudi Arabia and Venezuela); and (c) some countries which [illegible] make it difficult [illegible] ng countries. Such [illegible] population growth; [illegible] because of their [illegible]

[4] E. G Stockwell, "Some observations on the relationship between population growth and economic development during the 1960s", *Rural Sociology*, vol 37, No 4 (December 1972), pp 628-632, found a negative correlation for 26 countries, including, however, both developed and developing ones

[5] J C Chesnais and A Sauvy, "Progrès économique et accroissement de la population une expérience commentée", *Population*, vol. 28, Nos 4-5 (July-October 1973), pp 843- [illegible] of developing countries", *The Annals* [illegible] *A* [illegible] *Academy of Political and Social Scien*[illegible]) pp 98-108

This does not mean, however, that in specific conditions different rates of population growth and different demographic patterns do not have a significant impact. In fact, the potential importance of population for economic growth is suggested by the positive and significant, although not extremely high, correlation found between population growth and the rate of growth of total product.

14. With agriculture still playing a predominant, although diminishing, role in the socio-economic structure of the great majority of the developing countries, the comparatively slow progress of agriculture in these countries as a whole is of special relevance. About half of the world population still depends directly upon agriculture. However, while in the developed market economies, the agricultural population amounted to only about 13 per cent of the total in 1970, in the developing market economies in the same year, the figure was still as high as 64 per cent. However, due to increasing migration streams from rural to urban areas in the course of recent decades, the growth of agricultural population has been moderate and, consequently, its share in the total has declined substantially. For the world as a whole, the proportion of the agricultural population is estimated to have fallen from 63.5 per cent in 1950 to 51.2 per cent in 1970. In the more developed regions, the proportion of agricultural population dropped from 35.1 to 18.9 per cent over this period, while in the developing regions as a whole, the percentage is estimated to have decreased from 77.8 in 1950 to 64.3 in 1970. These changes reflect an over-all moderate growth of agricultural population in the developing countries and in some instances even a decline in absolute numbers, such declines being typical of the more developed countries. The comparatively slow growth of agricultural population in the developing regions was accompanied by an expansion of agricultural land of about the same magnitude, so that, on the whole, the number of persons dependent upon agriculture per unit of agricultural land did not change much during the past decade.

15. Even though a moderate growth of agricultural population, its declining proportion in the total and the absence of further deterioration of agricultural land per person dependent upon agriculture suggest relatively favourable developments, other aspects convey a much less encouraging impression. The growth of agricultural production in the developing regions was only moderate and considerably below that of total product. With the agricultural population in the less developed market economies growing at a rate of about 1.7 per cent during the 1960s and agricultural product increasing at an estimated 2.8 per cent per annum, the product per person in agriculture rose at a relatively moderate rate of about 1.1 per cent each year. In contrast, in the more developed regions, decreasing numbers of those dependent on agriculutre accompanied by a growth of agricultural production of about the same order of magnitude as in the developing regions implied an increase of product per head of the order of 4.5 per cent. Levels of income of the agricultural population of the developing countries not only increased slowly, and deteriorated sharply compared with those of the agricultural population in the developed regions, they also remained increasingly behind levels of *per capita* product in the non-agricultural sectors of their own economies.

POPULATION, FOOD AND NUTRITION

16. Food is man's most essential necessity and the development, and even survival, of any society depends to a great extent upon its capacity to provide its members with at least the minimum requirements of food. It is for these reasons that the relationship between population and food is very close. The following considerations relate to some of the major aspects of trends in population, food supply and nutrition in the course of the past decades.[6]

17. Although during the past two decades, the growth in world food production outpaced that of population by a considerable margin, a substantial excess of the increase in food production over population was found only in the more developed regions, whereas the margin in the developing regions, where population increased much more rapidly, was very small. The world food production and that in both more developed and less developed regions are estimated to have increased by about 3.0 per cent annually between the early 1950s and 1970. With world population growing at an average of 1.9 per cent per annum, during this period, *per capita* food production expanded at an average rate of 1.1 per cent. Even though total food production in both developed and developing regions expanded at a rate of about 3 per cent per annum, the differential in population growth between them implied quite distinct trends in *per capita* food production. Population in the developed regions increased at an average rate of 1.2 per cent per annum, and *per capita* food production consequently at 1.8 per cent. In contrast, in the developing regions population growth rates of 2.4 per cent signified an increase in *per capita* food production of only 0.6 per cent.

18. Within the post-war period, moreover, conditions have deteriorated to the extent that while the growth of population tended to accelerate, that of food production slowed down, resulting in a significant lowering of the margin of food production over population, which had its major impact in the developing countries. The growth of food production in the world, developed and developing regions, was around 3.2 per cent between 1952 and 1960, but decreased to a rate of about 2.8 per cent between 1960 and 1970. Since during these two periods world population growth accelerated from 1.8 to 2.0 per cent per annum, the growth in *per capita* food production declined from

[6] Some of these issues are also discussed in a study by the Food and Agriculture Organization of the United Nations, "Population, food supply and agricultural development", *Population Debate*, vol. I, part four.

about 1.4 per cent per annum in the 1950s to only 0 8 per cent per annum through the late 1960s. The slow-down in the growth of food production affected both developed and developing regions, but its impact on the former was ameliorated by a declining population growth (from 1.3 to 1.1 per cent) and *per capita* food production continued to expand significantly (1 5 per cent per annum compared with 1.9 per cent in the preceding decade) The evolution in the developing regions, however, was much less favourable. population growth there rose from an average 2 2 to nearly 2 5 per cent per annum, whereas the increase in food production slowed down in Africa and Asia, although it accelerated in Latin America, thus considerably reducing the margin over population growth in the former two regions. The margin between food production and population growth narrowed to a negligible fraction in Africa, where the growth rates of population and food production during the 1960s were, respectively, 2.5 and 2 6 per cent per annum Food production outpaced population growth by 0.5 per cent in Asia during this period, a substantial decline compared with the growth rate of *per capita* food production of 1.4 per cent during most of the 1950s A relative improvement occurred only in Latin America where a modest growth rate of *per capita* food production of 0 4 per cent in the 1950s rose slightly to 0 6 per cent per annum between 1960 and 1970.

19 The ramifications of the narrow and decreasing margin between the increase in food production and [illegible] lation increased faster than food production in 24 out of 72 developing countries for which data are available For recent periods, this figure was even higher [7] Moreover, the actual demand for food, it should be recalled, is a function not only of population growth and composition, but of levels of income The high income elasticities in the demand for food in the developing countries signify that rising levels of income will be associated with a substantial rise in the demand for food, adding significantly to that created by population growth In as many as 18 out of the 48 developing countries where food production increased more rapidly than population, food production did not keep up with the increase of the demand for food between the years 1952-1971 [8] The failure of food production to keep up with the growth of population or effective demand has, in addition, increased the reliance of the developing countries on imports of food-stuffs or reduced their exportable surplus. High population growth, moreover, may not only have the effect of increasing the demand for food in the developing countries, but at the same time may hamper their efforts to raise production, especially when the rapid increase in numbers is add to an already existing pressure of population on ag cultural resources.

20 *Considerable disparities exist between the mo* developed and less developed regions with respect food supplies and nutrition, and the incidence of nut tional inadequacy in the latter may be considerabl Although the assessment of the nutritional status a the importance of short-comings in this respect prese a number of problems, the available estimates confir the existence of considerable differences between t regions It has been estimated that the daily *per capi* availability of calories in the developed regions excee that of the different developing regions by margi varying from about 23 per cent (Latin America) 40 per cent (Africa) to as much as nearly 55 (Asia While available supplies in the developed regions ar on average, some 20 per cent in excess of requirement in the developing countries they fall some 4 per ce short of needs Calorie deficiencies are most pronounce in Asia, representing 11 per cent of requirements T shortage in Africa amounts to about 4 per cent, whi in Latin America, supplies exceed requirements about 8 per cent Estimates of protein requirements ar supplies suggest the existence of a surplus of availabil in all regions of the world, although the position of t more developed countries is considerably more favou able than that of the less developed ones, where t surplus is about 47 per cent of requirements compare with 129 per cent for the more developed region However, national averages of calorie and protein su plies conceal great differences in the distribution such supplies and, therefore, may underestimate co siderably the magnitude of nutritional problems Serio nutritional inadequacies may exist even where t average *per capita* supplies meet or even exceed requir ments Although the lack of data on the distributio of food supplies among individuals, families or soci economic groups makes a precise assessment impo sible, it has been estimated that the number of thos in the developing areas who are undernourished, th is, who suffer from an inadequate calorie intake, vari between 300 million and 500 million in the early 1960 Recent data suggest that this number has not decline significantly since then [9]

Population and education

21 The importance of the interrelationships b tween population and education, as both a means and an end of development, has been frequent stressed Education is not only affected by populati variables, but, conversely, educational developme affects the dynamics of population. This part of t paper is concerned mostly with the former relation a includes a brief statistical account of the trends educational development, particularly school enrolmen and population in the course of the recent decade

[7] Food and Agriculture Organization of the United Nations, *loc. cit.*, annex.
[8] *Ibid.*

[9] *Ibid.*, para 23

Such a review, it must be noted, is severely restricted by statistical limitations. There are considerable gaps in the existing data, and the analysis of international trends, even where data are available, is further hampered by problems of comparability, due in part to the different characteristics of national educational systems. Nevertheless, the present review does provide some indications of educational progress in relation to population trends.

22. Between 1950 and 1968, total school enrolment in the world's major regions combined is estimated to have increased by about 110 per cent, more than twice as fast as total population, estimated to have grown about 40 per cent. In 1968, in all countries for which data are available—which exclude, however, China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam—nearly 460 million persons were enrolled at the three main levels of education (primary, secondary and higher). This number was more than twice the corresponding estimate—of some 220 million—for 1950. The estimates for these two years imply an annual growth rate of 4.1 per cent, more than double the rate of population growth during the same period (1.9 per cent). In both more developed and less developed regions, growth rates in enrolment were at least double those of population. Between 1950 and 1968, total enrolment in the developing regions considered here increased at a rate of 5.7 per cent per annum, as against a rate of population growth of 2.3 per cent. For the more developed regions the respective rates were 2.6 and 1.2 per cent, respectively.

23. Within this period, the growth of school enrolment accelerated from 3.4 per cent per annum in the 1950s to 4.5 per cent between 1960 and 1968, while population growth rose from 1.8 to 2.0 per cent, but in the developing countries, the rate of growth of school enrolment accelerated less than that of population. The more rapid increase of world-wide enrolment in 1960-1968 as compared with the 1950s reflects mainly a sharp increase in the Union of Soviet Socialist Republics, where the enrolment growth rate jumped from 0.5 per cent per annum to 4.4 per cent per annum, in the two successive periods considered. In the other more developed regions, school enrolment between 1960 and 1968 did not expand as rapidly as in the 1950s, but population growth in these regions also slowed down. In the group of developing countries for which data are available, total enrolment increased at virtually the same rate in the two periods—5.7 per cent per annum in the 1950s and 5.8 in the later period—but population growth in these regions rose from 2.1 to 2.5 per cent per annum over the same period (see table 3). Consequently, a relative retardation of the rate of growth in enrolment in these regions in comparison with the more developed ones would appear to have emerged. In the two subperiods, 1950-1960 and 1960-1968, the share of the less developed regions in the growth of total enrolment remained about 68.5 per cent, while their share in the world's growth of population increased from less than 73 to 80 per cent.

24. The virtual stabilization of growth rates in enrolment in the less developed regions reflects mainly the trends of education in Africa, where enrolment, which in the 1950s had increased at 8.2 per cent per annum—the highest rate of any region—slowed down to 6.2 per cent between 1960 and 1968, as population growth rates increased from 2.2 to 2.4 per cent. In Asia, total enrolment in 1960-1968 expanded faster than in the period 1950-1960—5.6 compared with 5.2 per cent per annum—but not enough to make up for the acceleration of population growth from a rate of 1.9 to 2.5 per cent per annum. In Latin America, a slight rise in enrolment growth rates from 6.1 to 6.2 per cent was absorbed by a corresponding increase in population growth rates—from 2.8 to 2.9 per cent per annum.

TABLE 3. GROWTH OF POPULATION AND TOTAL SCHOOL ENROLMENT, BY REGION, 1950-1960 AND 1960-1968

(Percentage)

Region	*Average annual rate of growth*			
	1950-1960		*1960-1968*	
	Population	*Enrolment*	*Population*	*Enrolment*
Total	*1.8*	*3.4*	*2.0*	*4.5*
More developed regions	*1.3*	*2.3*	*1.1*	*3.0*
Northern America	1.8	3.9	1.4	3.0
Europe	0.8	2.2	0.9	2.1
Oceania	2.3	4.9	2.1	3.7
USSR	1.7	0.5	1.3	4.4
Less developed regions [a]	*2.1*	*5.7*	*2.5*	*5.8*
Africa	2.2	8.3	2.4	6.2
Asia [a]	1.9	5.2	2.5	5.6
Latin America	2.8	6.1	2.9	6.2

[a] *Excluding China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam.*

25. The rapid expansion of total school enrolment during the past two decades has been accompanied by substantial differences in the rate of increase at different levels of education: the higher the level, the faster the rate of increase in enrolment. In the world as a whole and in both developed and developing regions, enrolment at the third level increased about 1.5 times as fast as at the secondary level. The more rapid growth of enrolment at the higher level was found in all regions except Africa and Latin America. Likewise, enrolment at the secondary level increased more rapidly than that at the primary level in all regions, with the margin being highest in the developed regions (see table 4). Of particular interest for assessing in general terms the impact of demographic trends on the development of education is the excess of the growth of enrolment over that of population. [10] Such comparisons reveal that the

[10] A more adequate method would, of course, be to compare in each case the growth of enrolment at different levels with the growth of the age groups corresponding to each of them. With the simpler method used here, the differences between growth rates of enrolment at each level and total population growth might be negative, as in the case of primary education in the Union of Soviet Socialist Republics.

considerable differences in the growth of enrolment between developed and developing regions are substantially reduced if population growth is taken into account, and that, in terms of educational development, progress in the developing countries has been an advance in education, if population growth is taken into account, at a much more modest level than the absolute increase in enrolment would suggest (see table 4) The enrolment in excess of population growth at the primary level in the developing countries—3.2 per cent per annum—is still considerably above that of the developed regions, where this excess is a negligible 0.1 per cent, as might be expected in view of the already high level of school attendance at this level in these regions. At the secondary level, however, enrolment growth in excess of population growth in developed and developing regions is about the same (4.1 and 4.2 per cent, respectively), and at the third level, it is higher in the developing regions, although the margin is relatively small (5.7 per cent for the more developed and 6.8 per cent for the less developed regions)

26. These trends imply a decline in the relative importance of primary education as compared with the secondary and tertiary levels in all regions, but the distribution of enrolment by different levels in the developing regions compared more unfavourably with that of the developed regions than in 1950 As is to be expected, the large majority of students is enrolled at the primary level. out of a total enrolment of nearly 460 million in 1968, primary education accounted for more than 330 million students, or about 72 per cent of the total. However, this proportion represents a considerable decline compared with that of 1950, when 80 per cent of the students were enrolled at the primary level. Commensurate with the drop in relative importance of the primary level, the proportion corresponding to secondary education increased from 17 per cent in 1950 to 23 in 1968, and that for the third level from 3 to 5 per cent. The relative importance of the primary level, however, decreased much more rapidly in developed than in the developing countries In 19 primary education in the latter regions accounted 82 per cent of the total, which was only slightly ab the percentage of 78 in the developed regions (t being due mainly to the high proportion for the So Union) By 1968, the proportion had decreased 79 per cent in the developing regions, but to 63 cent in the developed ones Gains in secondary tertiary levels in the latter regions were correspondin higher In 1968, second-level enrolment in the veloped regions represented 29 per cent of the to up from 18 per cent in 1950, and third-level enrolm increased from 4 to 8 per cent In contrast, in the l developed regions, gains were modest, with increa of from 16 to 18 per cent corresponding to the secon ary and from 2 to 3 per cent of the total for the th level However, the slower progress for the less veloped regions was mainly due to the initial conditi and subsequent evolution in Asia In this region, proportion of total enrolment at the first level already comparatively low and that at the second le already relatively high at the beginning of the peri Combined with a slow evolution since 1950, this m for little change in the distribution of enrolment different levels for this part of the world In the otl two developing regions, the relative importance enrolment at the primary level declined substantially that for the second level *increased correspondin* Although in this respect, the relative position of t developing countries compared with the developed or did not improve, the proportionate increases in th second-level enrolments indicates the beginning of shift towards the development of secondary and high level education. Even so, primary education in the regions is still a main concern both because of t comparatively low levels of enrolment prevailing a because of the rapid increase of school-age populati There is little room for doubt that the demand plac

TABLE 4. GROWTH OF POPULATION AND SCHOOL ENROLMENT BY LEVEL OF EDUCATION AND BY REGION 1950-1968

(Percentage)

Region	*Average annual rate of growth*				*Excess of enrolment over population*		
		Enrolment					
	Population	*First level*	*Second level*	*Third level*	*First level*	*Second level*	*Third level*
Total	*1.9*	*3.5*	*5.8*	*7.5*	*1.6*	*3.9*	*5.6*
More developed regions	*1.2*	*1.3*	*5.3*	*6.9*	*0.1*	*4.1*	*5.7*
Northern America	1.6	1.9	6.2	6.9	0.3	4.6	5.3
Europe	0.8	1.1	4.3	6.4	0.3	3.5	5.6
Oceania	2.2	3.3	6.7	7.8	1.1	4.5	5.6
USSR	1.5	1.3	6.5	7.3	−0.2	5.0	5.8
Less developed regions[a]	*2.3*	*5.5*	*6.5*	*9.1*	*3.2*	*4.2*	*6.8*
Africa	2.3	7.1	10.7	9.8	4.8	8.4	7.5
Asia[a]	2.2	5.2	5.6	9.2	3.0	3.4	7.0
Latin America	2.8	5.6	9.6	8.7	2.8	6.8	5.9

[a] Excluding China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam

on first-level education has absorbed resources which otherwise could have been applied to second- and third-level education.

27. Between 1950 and 1970, the number of children between 5 and 14 years—roughly the ages identified with primary education—in the less developed regions is estimated to have increased by 66 per cent compared with 35 per cent in the developed regions. The total number of children in the developing regions considered here is estimated to have been 290 million in 1950 and to have increased to 480 million in 1970. These numbers represent an average annual growth rate of 2.5 per cent, somewhat higher than the rate of growth of total population (2.3 per cent). In the more developed regions, the growth rate of the primary school-age population (1.5 per cent per annum) was also slightly above the growth rate of 1.2 per cent for the total population. The high growth rates of the school-age population among the less developed regions, varying from 2.5 per cent per annum in Africa and Asia to 3.0 per cent in Latin America, is particularly significant since the population between ages 5 to 14 years constitutes a high proportion of the total population, thus contributing to a higher educational burden to be borne by the rest of the population. In the developing regions, about 24 to 25 per cent of the total population is between 5 and 14 years of age, whereas the corresponding percentages in the more developed regions are only about 17 to 18 per cent.

28. Moreover, despite the rapid expansion in enrolment at the primary level which, at the rate of 5.5 per cent per annum in 1950-1968, is at least double that of the rate of growth in the school-age population (2.6 per cent per annum in 1950-1970), enrolment ratios (percentage of school-age children enrolled) are still relatively low in the less developed regions. For instance, in Africa, where the rate of increase in primary school enrolment is most rapid (about 7.0 per cent per annum in 1950-1968), it is seen that the percentage of children of primary school age who are enrolled rose to only 40 per cent in 1967-1968 from an estimated 34 per cent in 1960-1961. In Asia, estimates over the same period showed also a comparatively slow increase in primary enrolment ratios, from 50 to 55 per cent, although in Latin America, gains were more substantial, from 60 to 75 per cent. Clearly, the task of expanding educational facilities in the developing regions merely to maintain the current enrolment ratios, let alone to raise them, is made more difficult by the rapid growth of the number of school-age children.

29. Moreover, with respect to the development of primary education in the past two decades, the less developed regions are in an unfavourable position compared with the more developed regions where primary education can be considered universal and rates of population increase are lowest. In the latter group of regions, where primary-school enrolments have reached high levels equal to 95 per cent or more of their school-age population, the expansion of primary education has been affected largely by changes in the size of the 5-14 age groups. Thus, growth in primary-school enrolments, which averaged 1.4 per cent per annum in the 1950s, slowed down to 1.3 per cent between 1960 and 1968, as school-age population growth rates declined from 2.0 per cent per annum in the earlier period to 1.0 per cent during the past decade. It should be noted that since 1960 there has been hardly any change in the percentage of primary school-age children enrolled in the more developed regions although for all the regions combined, both developed and less developed, the primary enrolment ratio has risen from 63 per cent in 1960-1961 to 68 per cent in 1967-1968.

30. Although over the period considered enrolment ratios[11] for different levels of education increased for the world as a whole, patterns among individual regions varied greatly and, especially within the group of developing countries, suggested the importance of the initial levels of enrolment as a factor in recent trends. Despite large differences in levels of enrolment ratios, for the world as a whole percentage increases for each level were very similar, varying between 5 and 7 per cent. With the exception of enrolment ratios at the primary level in the individual developed regions, which were already very high, and the third level in developing regions, which were very low, changes in enrolment ratios for different levels and regions varied considerably (see table 5). In some cases, the gains were moderate, despite large differences in initial levels, such as in the case of the secondary level in North America, Oceania and Africa; in other cases, they were substantial—as was the case with the primary level for Latin America and the secondary level in both Latin America and Asia. As far as the enrolment ratios attained towards the end of the period in the developing regions are concerned, the initial level seems to have been of crucial importance. Percentage gains in enrolment during the period appear to have been closely associated with the level at the beginning of the period. This would imply that although the high growth of total enrolment in the developing countries is reduced to much lower levels if population growth is taken into account, the latter would seem to be of relatively secondary importance in changing enrolment ratios compared with the influence of the initial levels.

Population and labour force trends

31. The quantity and quality of the labour force play an important role in economic development and are in turn closely related to population trends. This part of the paper is concerned with the major trends in labour force size and growth in relation to population trends in the post-war period. The problems of comparability and consistency of labour force statistics are well known, especially as concerns the participation of

[11] Number of pupils enrolled at each level in relation to the number aged 5-14 years (for primary level); 15-19 years (for the secondary level) and 20-24 years (for third level).

TABLE 5. SCHOOL ENROLMENT RATIOS BY LEVEL OF EDUCATION AND BY REGION, 1960/1961 AND 1967/1968

Region	1960/61				1967/68		
	Percentage of children of primary-school age attending school at any level	*Percentage of children of secondary-school age attending school at any level*	*Percentage of children of primary- and secondary-school age (combined) attending school at any level*	*Third-level enrolment as percentage of population 20-24 years of age*	*Percentage of children of primary-school age attending school at any level*	*Percentage of children of secondary-school age attending school at any level*	*Percentage of children of primary- and secondary-school age (combined) attending school at any level*
Total	63	32	50	5 9	68	39	56
More developed regions							
Northern America	98	90	94	30.2	98	92	96
Europe and USSR	96	57	79	8.5	97	65	85
Oceania	95	28	66	10 1	95	30	67
Less developed regions							
Africa	34	12	24	0 8	40	15	28
Asia[a]	50	22	36	2 6	55	30	45
Latin America	60	26	45	3 1	75	35	55

SOURCE: *United Nations Educational, Scientific and Cultural Organization, A Summary Statistical Review of Educ the World* (ED/BIE/Confinted 33/Ref.1), p 26

[a] Excluding China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam

women, unpaid family workers and so forth Estimates of labour force and its characteristics for 1950 and 1960, as well as projections of these characteristics for 1970, were prepared by the International Labour Office [12] For reasons of comparability, the estimates for the centrally planned Asian economies—China, the People's Democratic Republic of Korea and the Democratic Republic of Viet-Nam—are not included in the following discussion.

32 The available data indicate that over the past decades the economically active population has increased in general and especially in the less developed regions at a lower rate than total population. It is estimated that in 1970, the world's labour force, excluding China, the People's Democratic Republic of Korea and the Democratic Republic of Viet-Nam, would amount to somewhat less than 1,130 million persons, an increase of about one third with respect to the estimate of close to 840 million for 1950. These estimates imply an average annual growth rate of 1.5 per cent, nearly one fourth less than the corresponding rate of 1 9 per cent per annum for the total population. The relatively slower growth of the labour force was especially marked in the less developed regions: between 1950 and 1970, their labour force is estimated to have increased at an average annual rate of 1.8 per cent as compared with a growth rate of the total population of 2 4 per cent In the more developed regions, labour force also increased more slowly than population, but the differential was much smaller, the corresponding average annual growth rates being 1.0 and 1 2 per cent, respectively, for the economically active and the total population.

[12] International Labour Office, *Labour Force Projections, 1965-1985*, vols I-V (Geneva, 1971)

33 Although changes in the size of the labou depend, apart from the growth of population, large number of other demographic, socio-ec and cultural factors, within the period 195(changes in labour force growth appear to have fo in general and particularly in the less developed those in population growth rates In all countri sidered here, population growth rates rose fr per cent per annum between 1950 and 1960 per cent in 1960-1970, and estimated labou growth rates followed the rising trends, increasin 1.4 to 1 6 per cent per annum in the two peri the less developed regions, an increase in pop growth from 2 2 to 2 5 per cent in the two d was accompanied by a rise in labour force grow from 1 6 to 2 0 per cent per annum Conversely, more developed regions, a slowing-down in pop growth (from 1.3 to 1 1 per cent in the two suc decades) was associated with a slight decline in force growth from less than 1.1 to less than 1 cent per annum This association is not always in the individual more developed regions (notably America and Oceania), but appears to hold fo of the less developed regions The greater the ac tion in population growth in these regions, the that in labour force growth.

34 The proportion of the total population labour force—or the crude activity rate—has d considerably during the period under conside with the decreases being especially pronounced less developed regions, thus raising their bur dependency in absolute terms as well as in com with the more developed regions The crude rate, which reflects the joint influence of demo and other factors on labour force participatio 41.8 per cent in the less deve

but is estimated to have dropped, by 4.3 points, to 37.5 per cent in 1970. This compares with a decrease of 1.7 points from 46.2 to 44.5 in the developed regions. Trends in both regions together were dominated by those of the less developed countries: the world-wide crude activity rate declined 3.6 percentage points from 43.5 per cent in 1950 to 39.9 in 1970 (see table 6). These trends caused the dependency burden, that is, the number of non-workers per hundred workers, in the less developed regions to increase by one fifth, from 139 in 1950 to 167 in 1970. Although the more developed regions also faced a greater dependency burden in 1970 than 1950 (the respective figures being 125 and 116), the rise was much less than in the less developed countries. As a consequence, the situation of the latter with regard to the more developed countries deteriorated significantly. While in 1950 the dependency burden in the less developed regions was one fifth higher than in the developed ones, by 1970 the gap had increased to one third. Crude activity and dependency rates vary considerably in the individual regions; but in all cases, those of the developing regions were respectively lower and higher than in the more developed regions. The low crude activity rate of 31.1 per cent for Latin America implies a very high rate of dependency of 222, while crude activity rates of 38.5 in Africa and 38.7 per cent in Asia imply dependency rates of 160 and 158, respectively. The latter, the lowest dependency rate of any developing region, was still somewhat higher than the highest dependency rate (154 for North America) in the developed regions and much higher than that in the Soviet Union, where a crude activity rate of 50.8 per cent implies a dependency rate below 100, the only region where such a rate prevails.

35. Although substantial differences exist between developing and developed countries with respect to the population in working and inactive ages—as one of the determinants of the relative size of the labour force—changes in the age distribution in the post-war period have been relatively minor and were not a major factor in changing crude activity rates. The proportion of the population in active ages, 15-64 years, represented 56.0 per cent of the total in the less developed regions in 1950, compared with 65.1 per cent in the more developed ones. These percentages imply ratios of the population in inactive ages to that in active ages of 78.6 in the developing and 53.6 in the developed regions. The relatively heavier burden that the developing regions faced changed little in the post-war period. In both developing and developed regions, the proportion in active ages declined—from 56.0 to 54.6 in the former, and from 65.1 to 63.0 in the latter. These changes were associated, however, with different shifts in the inactive ages. In the less developed regions, the population below working ages, up to 14 years, increased its share of the total (from 40.6 to 42.1 per cent), while the proportion of the older ages remained virtually unchanged (3.4 per cent in 1950 and 3.3 in 1970). In contrast, in the more developed regions, the proportion of the population in ages 65 years and over increased (from 7.9 to 10.0 per cent), while the percentage for the younger ages was the same in 1950 and 1970 (27.0 per cent).

TABLE 6. CRUDE ACTIVITY RATES, BY REGION, 1950-1970

(Percentage)

Region	Crude activity rate		
	1950	*1960*	*1970*
World[a]	*43.6*	*41.6*	*39.9*
More developed regions	*46.2*	*45.1*	*44.5*
Europe	46.3	45.0	43.8
Northern America	39.9	38.8	39.4
Oceania	43.0	40.9	41.3
USSR	52.1	51.5	50.8
Less developed regions[a]	*41.8*	*39.5*	*37.5*
Africa	42.5	40.4	38.5
Asia[a]	43.1	40.8	38.7
Latin America	34.7	32.8	31.1

SOURCE: Population data supplied by Population Division of the United Nations. Labour force data from International Labour Office, *Labour Force Projections, 1965-1985*, vols. I and V, (Geneva, 1971).

[a] Excluding China, the Democratic People's Republic of Korea and the Democratic Republic of Viet-Nam.

36. Changes in participation rates at different ages have been principally responsible for the changing proportion of the population in the labour force. In both developed and developing regions, participation rates in all of the broad age groups (10-14, 15-64, 65 and over) for both males and females fell between 1950 and 1970, the only exception being the central age group of females in the more developed regions. In general, male participation rates for the extreme age groups were the most affected. Considerable declines in rates occurred in the advanced ages in both more developed and less developed regions and in the young age group in the developing regions (see table 7). Standardization by means of applying the 1950 age distribution to the 1950 and 1970 participation rates confirms the predominance of changes in participation rates as factors in the decline of crude activity. In the case of the more developed regions, such a calculation shows that about two thirds of the fall in the crude activity rate was due to declining participation and one third the result of changes in age distribution. The influence of the latter factor was even smaller in the less developed regions: only about one fifth of the lowering of the crude activity rate can be attributed to it, whereas changing participation rates accounted for four fifths of the decrease.

SOME TENTATIVE CONCLUSIONS

37. One of the fundamental issues in the discussion of the population problem in the post-war period is the effect of demographic trends in the developing

TABLE 7. CRUDE ACTIVITY AND AGE-SPECIFIC PARTICIPATION RATES, BY REGION, 1950-1970

Activity and age (years)	*World*[a]			*More developed regions*			*Less developed regions*[a]		
	1950	*1960*	*1970*	*1950*	*1960*	*1970*	*1950*	*1960*	*1970*
					Both sexes				
Percentage economically active: total population, all ages	43.6	41.6	39.9	46.2	45.1	44.5	41.8	39.5	37.5
Participation rate, 10 and over	57.8	56.5	54.0	56.3	56.2	54.2	59.0	56.7	53.9
10-14	19.9	16.5	13.6	6.9	3.8	2.3	26.4	22.0	18.0
15-64	66.6	66.3	64.5	66.7	68.3	67.5	66.6	64.9	62.8
65 and over	34.0	28.8	24.8	26.9	21.7	17.8	44.5	40.2	35.4
					Males				
Percentage economically active: total population, all ages	59.4	56.2	53.8	61.5	58.2	56.7	58.1	55.0	52.4
Participation rate, 10 and over	79.5	77.0	73.5	76.2	73.8	69.9	81.8	79.0	75.6
10-14	25.0	20.3	16.2	7.8	4.1	2.5	33.7	20.3	21.6
15-64	91.3	89.9	87.4	90.1	88.9	85.8	92.1	89.9	88.3
65 and over	55.3	47.1	40.0	42.2	33.1	25.9	72.2	66.1	57.8
					Females				
Percentage economically active: total population, all ages	28.1	27.3	26.1	32.3	33.1	33.2	25.3	23.7	22.3
Participation rate, 10 and over	37.1	36.7	35.0	38.9	40.6	39.9	35.7	34.0	31.9
10-14	14.7	12.5	10.9	6.0	3.6	2.2	19.1	16.4	14.4
15-64	42.8	43.2	41.8	46.1	49.6	50.2	40.2	38.7	36.7
65 and over	17.3	15.2	13.5	16.1	14.2	12.7	19.3	17.0	15.0

[a] Excluding China, the Democratic People's Republic of Korea and the Democratic Republic of Viet Nam

countries on their economic growth and social progress. Analytical studies and models dealing with these effects suggest, in general, that rapid population growth and the characteristics associated with it place a heavy burden on the economy and society. The basic argument is that a rapid increase in numbers, a high dependency and rapid urbanization imply an accelerated expansion of virtually all needs only to maintain existing levels of living. The satisfaction of these needs—including consumer goods, education, housing, health and other social services—would divert resources, which under alternative conditions would have been available for raising levels of living. Although the underlying hypotheses of these studies and the type of models used have not remained unchallenged, the view that the growth of income and social progress would be faster the slower the growth of population remains widespread.

38. A review of some major economic and social correlates of population trends over a recent period would appear to give some support to those inferences, but in other respects suggests a number of qualifications:

(*a*) It should be pointed out that the potentially negative effects of rapid population growth should not be understood to mean that it would prevent all socio-economic progress. Growth of total and *per capita* product, as well as educational enrolment, for instance, have outpaced population growth by a considerable margin in recent decades. In fact, in the course of the admittedly relatively short post-war period, economic growth and social progress in the developing countries probably has been faster than ever before, despite rapid population growth;

(*b*) Simple comparisons, such as those undertaken with regard to the growth of population and product are, on the whole, inconclusive as to the possible implications of rapid population growth. The analysis by means of simple correlation of the growth of population and *per capita* income reveals no evidence of a systematic relationship between the two. However, the question may be raised whether any specific relationship which would exist could be expected to manifest itself given the superficial nature of such comparisons;

(*c*) There would appear to exist little room for doubt that rapid demographic expansion is a burden whenever it absorbs resources which otherwise might have been used for increasing levels of living without giving rise to an at least proportionate increase in resources. This is the case for education, as the cost of providing basic education to a rapidly growing school-age population represents an increasing share of the financial resources. Rapid population growth also has been a major factor in the rapid growth of the demand for food without giving rise to a corresponding acceleration in food supplies. Estimates indicate that in the developing regions food production barely increased as fast as population and that in a number of countries it remained in fact behind the increase of population. Although data are lacking, it may be possible that

somewhat similar conditions prevailed with respect to housing.

39. Despite all these circumstances, the fact remains that the post-war period has been exceptional not only with respect to population growth, but with respect to economic and social progress. But there is no assurance that these rapid development trends will continue, whereas population growth has an inertia of its own which creates the expectation of large future increases in numbers. Moreover, even if progress in the less developed regions is undeniable in absolute terms, the relative position of the developing countries with regard to the developed ones has, in general, not improved. Indications are that the developing countries have reduced the gap separating them from the developed ones only in those areas where the latter had reached or come close to the attainable limits. This was the case, for instance, in primary education and, probably, in expectation of life at birth. In general, however, trends indicate a widening of the gap. Under prevailing conditions, and disregarding gains in absolute terms, this increasing gap maintains, in the developing regions, an awareness of unfulfilled objectives, not so much on economic as on psychological grounds. The latter is probably no less important an element of development than are economic factors.

40. Lastly, whatever may be the impact of population on socio-economic development, it is important to recall in this context that development bears with it the seeds for a reduction of fertility and the slowing-down of population growth to levels which would facilitate the solution of both the more immediate as well as long-term problems of development. The findings of this short and incomplete review suggest that the outlook for such a solution may be somewhat more favourable than the analytical studies and models would lead one to believe. They, therefore, call for a careful re-evaluation of the prevailing views on the impact of population trends on economic and social development.

POPULATION AND DEVELOPMENT IN PERSPECTIVE, WITH PARTICULAR REFERENCE TO THE SECOND UNITED NATIONS DEVELOPMENT DECADE *

Józef Pajestka **

General observations and assumptions

Need for world population policy

1. There is almost no doubt that the earth is incapable of sustaining an unlimited population because of its limited size and natural resources. Account must also be taken of the fact that the tendency towards improved material levels of living is irresistible, and *one must consider this tendency—to an important* extent—fully justified, particularly, though not only, on account of the aspirations of the poor, underprivileged segment of mankind. This trend inevitably increases the drain on natural resources and brings closer the point where further population growth could proceed only at the cost of deteriorating living conditions. Clearly, this point can be greatly modified by advances in science and technology, but one feels, though intuitively, that with growing population it has to exist despite all technological progress.

2. On this assumption, which is quite prevalent in contemporary thinking, one conclusion has to be formulated: there is a justified need for a world population policy. One should not, however, formulate this conclusion too hastily, particularly if one understands the term "world policy" in a rather strict sense, implying formulation of objectives and world policy measures. There appear to exist two important qualifications to it which require very careful consideration.

3. The first qualification refers to timing. As a matter of fact, based on extrapolation of population trends and recognition of the world's limited size and resources, one could have formulated the same conclusion half a century ago, or even earlier. The question is whether it would have been correct for policy recommendations to have been formulated at that time. Most people would rather doubt it. Then, one may ask whether the current time is ripe for these kinds of policy recommendations. This most crucial question must be answered. The judgement, however, cannot be based only on the kind of general reasoning presented above. *While theoretical argumentation has its own logic and* privileges, policy argumentation is based on other principles. And the latter has to be based primarily on recognizing whether the problem is really mature or will mature in a time horizon which requires current action or preparation for it.

4. The second qualification refers to the general context of world development problems and policies. Many pressing and challenging problems face mankind today, and their gravity is growing. Among these problems are the increasing discrepancies in economic standards of the various population strata, countries and whole continents, which also result in certain differentiations of the qualitative features of human beings, *the menacing deterioration and even degradation of the* natural environment, the great irrationality of the armaments race, the distorted scientific and technological progress etc.

5. These problems are interconnected and produce certain feed-backs which are clearly not favourable for the future of mankind. Understanding that situation, one must recognize that the plea for greater world-side rationality is fully and increasingly justified. In this *respect, however, two observations appear relevant:*

(1) World rationality has to be global, embracing all crucial issues, and it must put the correct emphasis on each issue. Thus, putting strong emphasis on "more rational" world population patterns, while neglecting certain other most essential problems, might lead to erroneous conclusions—distorted diagnosis and disoriented policy conclusions;

(2) Full account has to be taken of the world's capab*ilities to implement the policies corresponding to* greater world-wide rationality. This capability should be expected to evolve only gradually. And it is the author's opinion that it will evolve in other fields rather earlier than in world population policy.

6. Taking a general position with respect to the above-stated problem, the following proposition is formulated. One should recognize the long-range need for framing a world population policy, and it appears justified that United Nations activities should take this into perspective consideration. The problem should be approached gradually, with due attention paid to all the other issues which require more rational world-development patterns, and their interlinkages, and the readiness of countries to accept them.

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Certain principles for analysis and recommendations

7. The population problem is an issue of high complexity and sensitivity because of its political, economic, social and ethical implications. Without going into all its intricacies, it seems worth while to call attention to a few particular points. In this context, it is suggested that a certain number of principles be accepted for all population analyses and eventual recommendations, particularly within the United Nations framework. Though these principles are certainly accepted by many, it appears useful to have them formulated clearly.

The addressee

8. The addressee of all kinds of general population diagnoses and eventual recommendations should be humanity as a whole, and not the poor, economically less developed countries. There should be no implied suggestion that "the poor should stop reproducing themselves because they are poor", or that "all the danger of over-population of the world comes from the developing countries" etc. When one deals with global problems of the progress of human civilization, and includes population considerations among them, it is a matter of concern for all humanity, embracing both the developed and the developing countries. When the latter deal with their own population problems, they certainly should know, for their own sake, what is involved. For world considerations, however, one should refrain from formulating the problem in terms of one group of countries *versus* another, particularly as that may also imply certain racial considerations. This principle is supported by both political and ethical considerations. To follow it carefully might contribute to greater readiness in acceptance of eventual recommendations.

Existence of objective tendencies

9. From the available evidence, it can be observed that certain regularities in population trends are a function of the progress of civilization. Certain peculiarities also appear, but, by and large, they can be explained. There is, however, a lack of sufficient evidence because of the fact that many of the developing countries have not yet reached higher standards of civilization. One cannot confirm for them by evidence that, as a result of general progress, birth rates will drop as they did in the currently advanced countries.

10. Against this lack of evidence, there do appear certain extrapolations of population growth rates which project into the future the currently high rates of population growth in the developing countries. Were one to try to find any sort of argument behind this kind of extrapolation, only two seem logical. The first is that the countries considered will not be able to reach the higher standards of civilization. The second is that certain countries or races behave differently and have, "by nature", high birth rates. This kind of superstition is shared by certain circles of public opinion in the developed countries. Unless there is strong opposing evidence (which is certainly doubtful), the author would suggest acceptance of a principle that all population forecasts and considerations be based on an assumption that people throughout the world are very similar, and that the regularities between population tendencies and the progress of civilization appear universally.

Nature of world population policy

11. The growing need for a more rational world-wide development pattern is tantamount to the need for formulating some sort of world policy. In this respect, however, it is necessary to take into account the specific nature of the problems considered. The urgency of the population problem within the context of global world issues, on the one hand, and its great sensitivity for human nature, on the other, do not justify taking hard, determined world policy measures. Therefore, any current use of the term "world population policy" should be understood as a kind of very "soft" policy, not implying any sort of targets but setting and limiting policy measures to assist in the indirect influencing of population trends.

Population growth not main source of world problems and population policy not primary means of solving them

12. Accepting the gravity of long-term questions and prospects of development of human civilization, it is most important to see the various issues involved in the proper proportions. In this context, it seems relevant to observe that population has not been the main cause of the most pressing troubles of the world, nor is population policy the main cure for them.

13. Some analysists are inclined to see in the population problem the main challenge faced by mankind. They like to put forward very long-term arguments demonstrating that unlimited population growth endangers all mankind. They also like to bring forward the arguments that high rates of population growth hamper growth of *per capita* income in the developing countries. Whatever the truth in these arguments, it appears absolutely clear that it is not through population policy that the most pressing current world problems can be solved. Population policy is not a universal substitute for other necessary policy measures. Bringing it to the fore is a kind of escapism from the other most essential, though undoubtedly very difficult, problems which have to be faced and solved within both the national and the international framework. This observation does not, of course, imply that the role of population policy is insignificant.

Population trends and policies for the Second United Nations Development Decade

Policy diagnosis and statements

14. It is remarkable that in the document adopted by the General Assembly of the United Nations on the

International Development Strategy for the 1970s, population policy appears neither in the formulation of goals and objectives nor in the formulation of world policy measures The document states that, "Every country has the right and duty to develop its *human* and natural resources . . .".[1] This statement should imply that the world community has not yet judged it timely to proclaim any sort of "world population policy" and to include it in the framework of the international development strategy for the 1970s. But it also means that population policy has not been considered necessary for achieving the goals of the Decade This statement, however, may require certain qualifications

15. The General Assembly document on the Decade also states. "The target of growth in average income per head is calculated on the basis of an average annual increase of 2.5 per cent in the population of developing countries, which is less than the average rate at present forecast for the 1970s "[2] In the report of the Committee for Development Planning, experts' proposals for international development strategy for the Decade were formulated Referring to the assumption of 2 5 per cent average annual increase of population over the Decade, the report states· "It is therefore implicit in the assumption that measures would be taken to reduce the average birth-rate, as a minimum, at an equal pace with the declining average mortality rate so that population growth is prevented from accelerating."[3] The report further states· "What is called for is the implementation of a population policy which is effectively conceived to influence the main determinants of demographic growth."[4] These formulations, however, have not been accepted in the General Assembly document on the Decade.

16. With respect to the policy measures, the General Assembly document states: "Those developing countries which consider that their rate of population growth hampers their development will adopt measures which they deem necessary in accordance with their concept of development."[5]

17. International measures are limited to "provide support through the supply of means for family planning and further research".[6] The recommendations of the Committee for Development Planning with respect to the policy measures are very similar. The cited report mentions that "knowledge concerning the problem and possible remedies should be widely disseminated and facilities of an appropriate character assured",[7] and further recommends "effective services for family planning truly available to at least half the population".[8]

18. All the statements given above mean that, both for diagnosis of world development problems for the 1970s and for international strategy considerations, if anything of a "world population policy" was envisaged, it was a kind which can be called a very "soft" policy.

19. It is also noteworthy that in certain other United Nations documents dealing with the most challenging world problems, the population policy is not even mentioned as being necessary for solving them. What is referred to here is the report of the panel of experts on development and environment[9] and the report of the Committee for Development Planning on mass poverty and unemployment.[10]

20 The foregoing citations clearly show that, on the one hand, the official United Nations documents are very cautious in advocating any sort of "world population policy", and the various expert groups dealing with the most crucial world problems evidently do not indicate this policy as being necessary for solving them On the other hand, however, there is a strong line of thinking emphasizing the population problem as a main challenge for the world, demanding urgent action.[11] Thus, there appears to be a rather deep conflict of opinions It must be determined if this controversy is a result of the different time-horizon considered (the above-mentioned United Nations documents concentrate on the Strategy for the 1970s, while the other argumentation takes a very long-run perspective), or whether it derives from a very different strategic diagnosis or some other general premise Resolving this question leads to answering a most pertinent problem with respect to whether a reappraisal of the International Strategy for the Second United Nations Development Decade is required. If the answer to that question is affirmative, the reasons should also be given· whether it is because of some new facts or trends which were not known before, or because of new arguments, of new understanding of world problems and tendencies

Recent trends in population growth and policies

21 The rate of population growth for the Decade, as assumed in the International Development Strategy, was based on a world population prognosis developed mainly within the United Nations. The world population prospects as assessed in 1968 set the annual rates of population growth of the less developed regions

[1] See *International Development Strategy. Action Programme of the General Assembly for the United Nations Development Decade* (United Nations publication, Sales No E.71 II.A.2), para 10 (author's emphasis).

[2] *Ibid*, para 15.

[3] *Towards Accelerated Development Proposals for the Second United Nations Development Decade*, report of the Committee for Development Planning (United Nations publication, Sales No. E.70 II.A.2), p. 7.

[4] *Ibid*

[5] *International Development Strategy* . . . , para 65.

[6] *Ibid*

[7] *Towards Accelerated Development* . . . , p. 7.

[8] *Ibid.*, p 8.

[9] "Development and environment", report submitted by a panel of experts convened by the Secretary-General of the United Nations Conference on the Human Environment, 4-12 June 1971, Switzerland (A/CONF.48/10).

[10] *Attack on Mass Poverty and Unemployment· Views and Recommendations of the Committee for Development Planning* (United Nations publication, Sales No. E.72.II.A.11).

[11] This line of thinking is particularly pronounced in Donella H. Meadows and others, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972).

of the world at 2.5 per cent for 1970-1975, and at 2.4 per cent for 1975-1980.[12] However, this prognosis was based on an assessment of annual growth rate of population for 1965-1970 of about 2.4 per cent, which proved to be rather conservative. More recent estimates for the developing countries assume the rate of population growth during the 1960s at about 2.7 per cent.[13] It was against these estimates that the assumption of 2.5 per cent of annual population growth rates in the developing countries called, though tacitly, for a certain decrease in population growth (for a reduction in the average birth rate) during the 1970s.

22. It must be emphasized that population policy is one of the major areas in which there has been an evident change in policy objectives in the developing countries. This change had already appeared in the late 1960s, and has been further emphasized in the 1970s. An increasing number of countries have set up facilities for family planning through provision of advice and furnishing of the necessary means.[14] A great majority of developing countries recognize that, even where a larger population might appear desirable because of a favourable men/resources ratio, a reduction in the rate of population growth would be likely to permit a more rapid achievement of the principal objectives of eliminating mass poverty and improving standards of housing, health and education.

23. There also appears to be new evidence that socio-economic progress and national population policy measures achieve results. Though the rate of population growth in the developing countries as a whole during the 1970s cannot be expected to fall below 2.5 per cent, as assumed in the International Development Strategy, there are already some important signs that the reduction will be achieved in large regions and in many countries or areas by the end of the decade. There have been significant declines in the birth rate in several countries in Latin America (Chile, Costa Rica, Guatemala, Cuba, Barbados, Guyana, Jamaica and Trinidad and Tobago); and a recent evaluation for the whole region states that, "The rate has probably reached its peak, will remain steady for a few more years, and should begin to decline around the end of the 1970s".[15] Similar phenomona and evaluations appear for Asia: significant declines in birth rates are estimated for Hong Kong, Singapore, the Republic of Korea, Malaysia and Sri Lanka. In many of the countries or areas, there has been evidence of declines in birth rates even before the institution of family planning programmes.

[12] "World population prospects, 1965-1985. As assessed in 1968" (ESA/P/WP/37).

[13] "Developing countries and the International Development Strategy" (E/AC.54/L.51/Add.1).

[14] The report to the United Nations Economic Commission for Asia and the Far East, twenty-ninth session, Tokyo, states: "Most countries of the region have included family planning in their development strategies" (E/CN.11/L.358, part one, chap. XI).

[15] Latin America and the International Development Strategy: first regional appraisal" (E/CN.12/947).

24. Concluding from the above-mentioned trends, it seems justified to state that the most recent experience has not added to the gravity of the population problem, as compared with the diagnosis carried out at the time of formulation of the International Development Strategy. On the contrary, the available evidence appears to indicate that the peak-rate of population growth which occurred in the second half of the 1960s will most probably fall during the 1970s because of the changing social and economic conditions and the more active national population policies.

Certain new considerations and long-term prospects

25. As previously mentioned, new lines of thinking on the world's prospects have been advanced recently. These projections have been based on long-term considerations and on the global, systems approach embracing a number of crucial determinants of the world's prospects. Those methodological premises are undoubtedly most valuable and promising. Still, they can be applied in a variety of ways.

26. In a study on the world's prospects, widely publicized and discussed, the following important statement reflects certain of its basic premises:

> "One of the most commonly accepted myths in our present society is the promise that a continuation of our present patterns of growth will lead to human equality. We have demonstrated ... that present patterns of population and capital growth are actually increasing the gap between the rich and the poor on a worldwide basis, and that the ultimate result of a continued attempt to grow according to the present pattern will be a disastrous collapse. The greatest possible impediment to more equal distribution of the world's resources is population growth. It seems to be a universal observation, regrettable but understandable, that, as the number of people over whom a fixed resource must be distributed increases, the equality of distribution decreases."[16]

Certain premises of that diagnosis are analysed below, albeit necessarily briefly:

(a) *Economic growth leads to inequalities.* Though one really knows this kind of historical experience, it has not been demonstrated that growth has to lead to inequalities. There are options: to stop growth; or to change its "current pattern" in a way allowing for greater human equality. While, however, this option is open for the world as a whole, for the poor countries there is no other alternative but to grow. And, it cannot be said that their growth leads to greater inequalities within the world framework, can it?

(b) *World population as an aggregate.* Global models have to operate with aggregates, and no one can reasonably object to it. However, they should not contain implied conclusions with respect to the component parts of the aggregates. This rule is quite often forgotten, as for example by statements that the popu-

[16] Donella H. Meadows and others, *op. cit.*, p. 178.

lation of the poor countries is growing faster than that of the rich countries. Though as a statement of fact this is absolutely true, its implied content is misleading when the argument is based on the limitation of natural resources and of environmental capacities. It cannot be forgotten that the use of natural resources (environmental aspects included) per person is from 10 to 20 times higher in the rich countries than in the poor ones;

(c) *Justification of inequalities.* Many would at least doubt whether a new "universal" justification of inequalities can be found, particularly in the light of the existence of limited resources. Humanity still has greater justice as its goal and will not take it for granted that injustice is a "natural" consequence of limited resources;

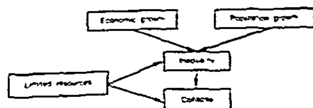
(d) *The relevant time-horizon.* Continuation of exponential growth leads, undoubtedly, to absurdity. Moreover, this observation is as correct today as it has been in the past. Its relevance for policies requires an appropriate assessment of the world's resources and of the potential technological change. Unless this assessment is done satisfactorily, the exponential growth argument is a "gimmick" which can be applied at any time to serve the desired purposes. It is the author's opinion that the above-mentioned assessment is still needed, and that it requires further serious studies.

27. The present author is far from implying that the authors of the ideas discussed above would not accept at least some of the above-mentioned comments. Their call for greater world-wide rationality is only to be supported. It is also clearly necessary to look at world problems and policies in the 1970s for a longer time-horizon and with a systems approach. Still, the new arguments put forward do not appear, as yet, to present any of the evidence necessary for changing the outlook of the world's prospects and, still less so, for reappraising the International Development Strategy for the 1970s. This is because these ideas reflect the authors' own philosophy (with respect to the above-discussed premises) rather than disclosing the world's real options and tendencies. And, it should be recalled, it is not the first time in the history of human thinking that powerful intellectual tools have been used in this way.

Basic feedbacks and certain conclusions

28. The above-discussed long-term diagnosis of the world's prospects can be presented as shown in figure I.

Figure I. Long-term diagnosis of world's prospects



The policy conclusions drawn therefrom are: zero economic growth (zero capital growth), zero population growth (zero population growth) and reduced human pollution.

29. This diagnosis of development interrelationships with respect to the world's prospects can and should be challenged. The crucial problem can be identified in ascertaining the existence of a feedback loop between population growth and inequalities within the world framework. In the author's opinion, there is sufficient evidence supporting the existence of a feedback interrelation, as shown in figure II.

Figure II. Feedback loop showing interrelations between population growth and inequalities



30. For particular social groups, for the whole country, and even for larger geographical regions, a vicious circle of poverty and population growth operates; high population growth adds to poverty and poverty to high birth rates. It would seem most important to ascertain the existence of this kind of vicious circle with scientific accuracy.

31. Equally important are the ways of breaking through this vicious circle. The available evidence demonstrates that this breakthrough is being achieved in a great and growing number of cases (countries) by way of socio-economic progress. The causes of fertility decline are very complex. They include such influences as high levels of living, urbanization, education, rising equality for women, the spread of old-age pension systems and the prohibition of child labour. All of them, however, have one common theme—economic and social progress of the broad strata of population. This does not mean, of course, that the same set of factors operates alike in all societies. Therefore, the above-mentioned feedback loop may change its direction: social and economic progress brings about a decline in fertility, and eventually in the population growth rate, which again gives rise to positive influences on further socio-economic progress. This feedback can be strengthened by appropriate policy measures, including provision of family-planning services.

32. Within the broad world framework, mass poverty can be said to be a result of world inequalities, and it is certainly not the limitations of natural resources which bring it about. Thus, by diminishing world economic and social discrepancies, one can contribute to slowing down world population growth. Policy conclusions on this basis have long been formu-

lated: better international division of labour; elimination of exploitation; economic aid; transfer of technology; disarmament etc. They can also be found in the International Development Strategy for the 1970s. One can question their sufficiency and efficiency, but that is another problem.

33. The indicated policy conclusions do not have, of course, the diminishing of the rates of world population growth as their primary objective. Their main orientation is on the well-known ailments and irrationalities endangering the prospects of mankind. Nevertheless, they should also be expected to bring about a deceleration in population growth.

34. A problem still arises whether there is time enough to wait until the progress of civilization based on greater world-wide rationality and equity brings about a decline in population growth, allowing for the prosperous development of mankind over a very long time-period. The only adequate comment on that question appears to be that one should study it very carefully, utilizing all the new experience available.

35. In all considerations on long-term prospects for mankind (population problems included), particular attention should be given to the general "philosophical" (or, if one prefers the term, "ideological") approach. In this context, one comment appears to be very appropriate: Mother Earth should not be blamed for what principally depends upon human beings. In this connexion, this author fully sympathizes with the demand for a profound change in human priorities and patterns of behaviour, within both the international and national frameworks.

LES FACTEURS ET LES INDICATEURS DU DÉVELOPPEMENT *

André Piatier **

1. Pour contribuer utilement à l'étude des rapports entre la population et le développement, un rapport sur les facteurs et les indicateurs de développement doit dépasser largement l'optique purement économique. Mais juxtaposer l'économique et le social est insuffisant : il faut parvenir à les intégrer dans un corps unique où la démographie trouve aussi sa place La deuxième Décennie des Nations Unies pour le développement doit, pour réaliser un développement accéléré [1], s'appuyer sur ce qu'on peut appeler, en reprenant une expression de l'Organisation des Nations Unies pour l'éducation, la science et la culture [2], la science du développement socio-économique

2. Fixer le taux d'expansion annuel du produit brut total à 6 p. 100 au moins et le taux d'expansion par habitant à 3,5 p 100 ne peut être qu'un objectif provisoire, fondé sur la seule considération d'une croissance probable de la population de l'ordre de 2,5 p. 100 par an pendant la Décennie Il ne s'agit là que de l'environnement matériel et le Comité de la planification du développement des Nations Unies ne pouvait aller plus loin [3]. Mais aujourd'hui, pour lier population et développement, un effort conceptuel supplémentaire est indispensable.

3. Dans la première partie de ce rapport, consacrée aux «facteurs du développment», il faudra donner place à l'homme, facteur de la production au même titre que le capital, variable privilégiée des économistes. De plus, l'homme étant le destinataire final de toutes les activités, il importera de montrer que le résultat véritable du développement ne se mesure pas, comme on le fait communément, à la dimension du produit (produit national brut, par exemple) mais à ce que l'homme en fait, en termes de niveau de vie. Enfin, la consommation n'étant qu'une étape intermédiaire et non pas la fin ultime de l'activité, il faudra saisir dans une sorte de comptabilité démo-économique, ce qui est fait par l'homme pour l'homme : un concept de « production extensive » s'exprime en nombre d'humains tandis qu'un concept de « production intensive » vise l'amélioration des humains existants au moyen par exemple, d'investissements en matière de santé ou d'éducation

4 La deuxième partie, consacrée aux « indicateurs de développement », s'efforcera de choisir, dans ce domaine élargi, les meilleurs instruments statistiques, ou les données qualitatives, qui permettront de suivre les progrès d'un développement englobant à la fois l'homme et les choses, l'homme et son milieu naturel

LES FACTEURS DU DÉVELOPPEMENT

Les facteurs de développement chez les économistes

5 Un premier recensement des facteurs de développement pourrait se faire par dépouillement des innombrables travaux économiques concernant le développement Il serait malheureusement, on le verra, très incomplet En effet, cette abondante littérature est hétéroclite. Elle se situe à des niveaux divers d'abstraction, elle tend souvent à démontrer une thèse a priori, par exemple priorité du développement industriel, rôle de l'aide ou rôle du commerce extérieur Il est difficile, pour ne pas dire impossible, de tout rassembler pour en faire un emploi combiné

6 Un autre classement séparerait les théories de la croissance, les théories du développement, les modèles de développement et les plans de développement. Ces quatre catégories sont, en général, autonomes [illegible] peu de points de passage de l'une à l'autre En simplifiant, on pourrait dire avec Ph Aydalot [4] que les théories de la croissance ont surtout été élaborées pour les pays développés [illegible] logue des freinages structurels opposés à leur progrès.

7. De son côté, l'économétrie a élaboré de très nombreux modèles de croissance, pour le plaisir, pourrait-on croire, puisqu'ils n'ont été utilisés pour la planification que dans des cas assez rares : modèle Mahalanobis pour l'Inde [5], modèle P. Frish pour l'Egypte [6],

* L'original de ce document (E/CONF 60/SYM I/6) a été rédigé pour le Colloque sur les relations entre la population [illegible]

** [illegible]

[illegible]

[2] Organisation des Nations Unies pour l'éducation, la science et la culture, *Approches de la science du développement socio-économique*, Paris, 1971.

[3] Voir *Vers un développement accéléré* [illegible].

[4] Ph. Aydalot, *Essai sur la théorie du développement*, Paris, Editions Cujas, 1971

[5] Mahalanobis, *The approach of operational research to planning in India*, Bombay, Asia Publishing House, 1963

[6] R. Frisch en dehors des documents officiels élaborés en Egypte, son modèle a été décrit dans *l'Egypte* [illegible], octobre 1960

modèle Chenery pour Israël[7], modèle Olivier, pour l'Algérie[8]. En corrolaire de cette remarque : presque aucun plan de développement ne s'appuie sur un modèle de référence.

8. Le caractère général de tous ces travaux est qu'ils se limitent pratiquement tous à une théorie de la production, et que, dans cette théorie, ils accordent une place privilégiée, au facteur « capital ». Une fonction de production plus ou moins élaborée est complétée dans de nombreux cas, par une fonction d'investissement. Telles sont les constructions bien connues d'Harrod, Domar, Samuelson, Solow, Phelps, Tobin, Okhiwa, Kaldor, pour ne citer que quelques noms : tous sont esclaves de leur conception centrale, la croissance équilibrée.[9]

9. La Commission des Nations Unies pour l'Amérique latine[10], bientôt imitée par la Commission des Nations Unies pour l'Asie et l'Extrême-Orient[11] ajoute au schéma de production quelques variables nouvelles telles que l'aide étrangère et la capacité d'importation.

Les insuffisances de l'analyse économique

10. Identifier développement et progrès de la production et lier le mouvement de la production aux disponibilités en capital était sans doute une attitude concevable dans les années 50 et même 60 lorsque la pénurie de capitaux semblait être l'obstacle majeur au développement. L'offre de travail a été peu traitée parce qu'elle paraissait pratiquement illimitée.

11. Il importe aujourd'hui de prendre une optique différente et de mettre au premier plan des facteurs quelque peu oubliés : la préparation du Congrès mondial de la population y incite : elle exige l'approfondissement des relations entre population et emploi.

12. Certes, le facteur travail (L) était bien inclus dans les fonctions de production, à côté du facteur capital (K), qu'il s'agisse de la formulation générale :

$$Y = f\ (K,\ L)$$

ou de celle de Cobb Douglas :

$$Y = A.\ K^{\infty},\ L.$$

mais seul K faisait l'objet d'analyses théoriques, L n'étant lié, on l'a vu, qu'au mouvement général de la population ou aux sorties du secteur agricole.

13. Dans tous ces travaux, le développement est implicitement assimilé au progrès de la production, lui-même confondu avec le progrès du revenu (Y). C'est finalement omettre l'accroissement du niveau de vie (arbitrairement corrélé parfaitement à l'accroissement de la production) et l'accroissement du capital humain.

14. Ce capital humain se développe de deux façons : extensivement par l'accroissement du nombre des hommes, et intensivement par l'injection dans le stock humain existant, de doses supplémentaires de santé et d'éducation.

15. Le secret du développement — qui paraît aujourd'hui bien périmé — était donc exclusivement l'augmentation de K, ce que déterminait la fonction d'investissement. Peu importe ici qu'il s'agisse de la dynamisation de l'égalité keynésienne $I = S$ par Harrod sous la forme : $Gc = s$

avec $G = \frac{\Delta Y}{Y}$, $c = \frac{\Delta K}{\Delta Y}$ et $s = \frac{\Delta S}{\Delta Y}$ c'est-à-dire la propension à épargner, ou de la formulation du taux d'accumulation du capital :

$$k = s\ \frac{Pr}{K} \quad (\frac{Pr}{K} \text{ étant le taux de profit })$$

16. L'expérience concrète des 20 dernières années a montré le caractère illusoire de ces constructions intellectuelles dont aucune des hypothèses ne peut raisonnablement être admise dans les pays en voie de développement (ni autre part, d'ailleurs) : concurrence parfaite, maximisation des profits, libre accès à tous les marchés, prévision parfaite, homogénéité et divisibilité du capital (le barrage d'Assouan n'est pas divisible), propension à investir des entrepreneurs égale à un, absence de spéculation, notamment immobilière, absence de thésaurisation et d'exportation des capitaux. L'énumération des conditions non remplies pourrait même fournir une nouvelle liste d'indicateurs, négatifs cette fois. Nous reviendrons plus loin sur cette notion d'indicateurs négatifs.

17. On pourrait même ajouter un indicateur du rôle de l'Etat puisque la quasi-totalité des auteurs, à l'exception de F. Perroux[12], oublient l'intervention du secteur public.

18. Les auteurs qui ont exploré une voie différente, A. Hirschmann, avec sa théorie de la croissance déséquilibrée[13], ou Galenson et Leibenstein[14], ou encore Dobb et quelques autres, finissent par prôner l'investissement dans le secteur d'équipement et l'investisse-

[7] H. B. Chenery et Bruno Chenery, "Development alternatives in an open economy: the case of Israel", *Economic Journal*, mars 1962.

[8] Voir R. Olivier, *Modèles de développement utilisés en Algérie*, Institut national de la statistique et des études économiques, école d'application, 1960. Essai de détermination des apports extérieurs nécessaires pour parvenir à un état de croissance auto-entretenue, Colloque sur les applications de la recherche opérationnelle aux sciences économiques, Paris, 1963.

[9] Voir sur ces auteurs, *Surveys of economic theory*, vol. 2, *Growth and development*, New York, St. Martin's Press, 1965, et surtout la contribution de F. H. Hahn et R. C. O. Matthews, "The theory of economic growth: a survey".

[10] *Analyses and projections of economic development. I. An introduction to the technique of programming* (publication des Nations Unies, numéro de vente 55.II.G.2).

[11] *Economic Survey of Asia and the Far East*, 1963; *Economic Bulletin for Asia and the Far East*, vol. XIV, nº 4 (imprimé également comme publication des Nations Unies, numéro de vente 64.II.F.1).

[12] F. Perroux, *Trois outils d'analyse*, Institut de science économique appliquée, Cahiers F1; *idem*, *Les techniques quantitatives de la planification*, Paris, Presses universitaires de France, 1965; *idem*, "Innovation et croissance", dans *Progresso Tecnologico e la societa italiana*, Milan.

[13] A. O. Hirschmann, *Stratégie du développement économique*, Paris, Les éditions ouvrières, 1964.

[14] Galenson et Leibenstein, « Investment criteria, productivity and economic development », *Quarterly Journal of Economics*, août 1955; H. Leibenstein, *Economic Backwardness and Economic Growth: Studies in the Theory of Economic Development*, New York, John Wiley, 1957. Voir aussi G. Abraham-Frois, *Essai sur les problèmes d'investissement en pays sous-développés*, Paris, 1962.

ment à haute intensité de capital : seul l'*investissement* hautement capitalistique dégagerait un « taux marginal de réinvestissement par habitant » substantiel, ce qui serait la condition de la perpétuation du mouvement. Ph Aydalot[15] a critiqué cette façon de voir de ces économistes qui pensent encore que ce sont les secteurs *intermédiaires nouvellement créés (c'est-à-dire secteurs* autres que ceux des matières premières et des biens de consommation finals) qui, dans la matrice *input-output*, exerceraient des effets d'entraînement vers l'amont (par leurs commandes) et vers l'aval (par les ventes engendrant des progrès de production outillage mécanique *pour l'industrie ou engrais pour* l'agriculture par exemple)

19. Mahalanobis en Inde[16] a toujours accordé la préférence aux industries lourdes qui créent, certes, des emplois, mais non le maximum d'emplois On peut reprocher à cette voie d'accentuer souvent le dualisme de l'économie, avec d'un côté un secteur moderne à haute intensité de capital et de l'autre côté, un secteur traditionnel (agriculture, artisanat et petites industries à faible intensité capitalistique). Le développement est alors l'apanage d'un « club d'initiés » dans lequel l'entrée est fortement contingentée

20 Le progrès technique a été longtemps une variable récalcitrante . il a été à peine effleuré dans quelques-uns des modèles précédemment étudiés · il était là plutôt *pro forma* que pour un traitement véritable La difficulté vient de ce qu'il s'identifie parfois à l'accroissement de *K*, *de ce qu'il surgit parfois sans* variation de *K* (progrès dans l'organisation et les méthodes) enfin de ce qu'il touche aussi le facteur travail (formation de la main-d'œuvre, rôle de l'assistance technique et aussi *learning by doing*)

21 La notion de *learning by doing* (apprentissage par l'expérience), dégagée par K. Arrow et reprise par D Lehvari[17] représente un gain incontestable : une même quantité de main-d'œuvre, exprimée en nombre de personnes ou d'heures de travail, peut obtenir des résultats très différents de production en fonction de l'habileté des travailleurs et de leur adaptabilité à certaines tâches L'accroissement de la productivité peut provenir non seulement de l'éducation et de la formation préalables, mais aussi de l'expérience : le progrès technique n'est plus ici une variable indépendante, tombée du ciel, il est induit par la production elle-même Malheureusement, au lieu de chercher du côté du « capital humain » les variables explicatives souhaitables, Arrow retombe dans les errements habituels puisque son *learning by doing* sera présenté dans une équation comme jouant uniquement dans le secteur des biens de production et comme dépendant de la production passée, de l'investissement cumulé et du temps écoulé Ph Aydalot[18] a fait une critique pénétrante de ces *tentatives pour intégrer sans succès le facteur* travail.

22 Un aspect que nous n'avons pas encore examiné, du modèle de Ranis et Fei[19], est plus prometteur analysant les diverses formes de progrès technique, *labor saving, capital using* ou *capital saving, labor using*, ils définissent une « tendance factorielle » par le souci de recourir à du travail et d'économiser du capital et lient le taux de croissance de l'industrie à l'accumulation du capital, à l'innovation et à la tendance factorielle

23 Solow[20] avait travaillé dans la même voie avec une fonction de production à substitution capital/travail, limitée, ainsi que Lewis[21] dont la théorie fournit un excellent repère de la fin de la phase de décollage · le *take-off* serait terminé lorsque, le travail étant devenu un facteur rare, le salaire réel, stable jusqu'alors, peut commencer à croître

24 Ranis et Fei vont plus loin retenant le taux de croissance de la main-d'œuvre industrielle comme indicateur implicite de l'effort de modernisation, ils cherchent à déterminer l'importance de cet effort en fonction du délai désiré du décollage (*T*), du taux de croissance de la population (τ), de la *proportion de population* agricole (*A*) et de la proportion non excédentaire de cette population agricole au début de la période (*R*). Avec un taux de croissance de la population (τ) de 2,5 et avec $R = 0,7$ l'Asie du Sud-Est devrait, pour décoller en 5 ans, faire un « effort de modernisation » *(taux de croissance des emplois industriels) de 10 p 100* par an Un décollage en 20 ans ramènerait cet effort à 5 p. 100 L'Afrique ou l'Amérique latine, avec un $R = 0,9$ décolleraient en 5 ans avec un effort de 8 p 100 et en 20 ans avec un effort de 4,6 p 100 par an.

25. Ranis et Fei ajoutent donc des éléments nouveaux concernant l'emploi, ils vont plus loin en élaborant une équation d'absorption de la main-d'œuvre pendant la période où le salaire reste constant, c'est-à-dire avant le décollage Ils remplacent le coefficient de capital par un coefficient d'équipement par travailleur qui se modifie par « effet horizontal » (absorption de travail sans capital supplémentaire) et non par « effet radial » (capital et travail augmentant simultanément) Le coefficient diminue si les innovations ne sont pas trop *labor saving*. Au Japon, le progrès technique a été, selon eux, responsable à 85 p 100 de l'absorption de la main-d'œuvre en *1890* de *50* p *100* vers 1904, de 10 p 100 en 1917 et a joué un rôle négatif après 1920 L'Inde, dès ses premiers plans, a augmenté au contraire les doses de capital par travailleur et n'a

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[15] Ph Aydalot, *op cit*

[16] Mahalanobis, *op cit*

[17] Voir K Arrow, "The economic implications of learning by doing", dans *Review of Economic Studies*, 1962

[18] *Ph* Aydalot, *op cit*

[19] Voir G Ranis et J. Fei, "A theory of economic development", dans *American economic review*, septembre 1961; et "Capital accumulation and economic development", dans *American Economic Review*, juin 1963

[20] K. Arrow, *et al.*, "Capital labor substitution and economic efficiency", dans *Review of Economics and Statistics*, août 1961

[21] W A Lewis, *Développement économique et* ' *fication les aspects essentiels de politique économique* 1965

pas tiré profit de son facteur surabondant. Là où le capital est rare, il faut exploiter toutes les possibilités de mettre en œuvre les innovations et la voie la plus favorable serait de miser sur celles qui sont *capital saving*.

26. Ces propositions sont inverses de celles qui s'appuient sur le taux marginal de réinvestissement, examiné précédemment, qui, lui, favorisait l'équipement hautement capitalistique. Elles ont eu peu de résonance dans le tiers monde soucieux de modernisme : on les y accuse de maintenir les pays dans leur sous-développement en les privant des formes les plus évoluées d'industrie et donc, d'accroître l'écart entre pays développés et en voie de développement. Pour les mêmes raisons, la théorie de H. Lary [22] fait figure de provocation. Restant dans la ligne néoclassique de l'allocation optimale des ressources, il estime que les pays en voie de dévelopment doivent exporter non seulement des produits demandant une forte proportion de travail, mais surtout demandant beaucoup de travail non qualifié. C'est l'application directe du théorème Heckscher-Ohlin que nous avons eu l'occasion de critiquer violemment [23]. Cette proposition a cependant une application probable pour les économies les plus arriérées.

27. L'argumentation de Ranis et Fei n'est cependant pas à négliger et ceci, pour une autre raison. Ils font remarquer que maximum de production et maximum d'emplois sont souvent confondus dans les plans de développement. Lorsqu'ils ne peuvent être atteints ensemble c'est l'objectif d'emploi qui est presque toujours abandonné : la performance « produit » l'emporte psychologiquement sur la performance « emploi ». Dans une analyse qu'il est impossible de reprendre ici, Ranis et Fei, caractérisant l'innovation par son intensité et par sa tendance à utiliser le facteur travail (tendance factorielle ou *factor bias*), déterminent une « frontière d'innovation » qui est la courbe de substitution entre intensité et tendance factorielle. Si l'on investit dans les procédés les plus modernes, l'intensité est forte et la « tendance » faible; si l'on s'adapte à la répartition des facteurs disponibles, c'est le contraire. Le Japon, au début du siècle se situait dans ce second cas et approchait le point maximum d'emploi sur la courbe frontière d'innovation. L'Inde des deux dernières décennies avait au contraire augmenté l'équipement par travailleur et se situait loin du maximum d'emploi et même en-dessous du maximum de production: des objectifs différents de planification auraient sans doute pu augmenter simultanément pendant un temps, production et emploi [24].

28. Certains auteurs, N. Kaldor par exemple [25], ont par ailleurs montré que le développement pouvait être stoppé et qu'une régression pouvait même survenir si le surplus agricole disparaissait par suite de la croissance de la population (ou d'une suite de mauvaises récoltes). Keyfitz avait fait des observations analogues sur les villages indonésiens asphyxiés par une croissance démographique rapide, combinée avec une productivité stable.

29. Même si ces théories paraissent incomplètes ou contestables, elles fournissent bon nombre de variables qui méritent d'être retenues parmi les indicateurs.

La prise en compte du facteur travail et des variables démographiques

30. Il faut aller plus loin sur la voie indiquée par les auteurs déjà étudiés. Les plans des pays d'Afrique francophone marquent une étape; presque tous proposent cinq objectifs :

1) Accroître le niveau de vie;

2) Développer le capital humain (éducation, formation professionnelle, santé);

3) Tendre à l'indépendance économique (diversifier la production, produire ce qui était importé, valoriser les matières premières, augmenter l'exportation);

4) Tendre à l'indépendance financière (diminuer l'aide et augmenter l'épargne intérieure);

5) Atténuer les disparités régionales.

31. Dans presque toutes les autres planifications, le point 2 fait l'objet de programmes distincts du plan économique général, ce qui, dans notre optique, est regrettable. Mais malgré leurs louables intentions les plans africains, faute d'un appui théorique suffisant, ne permettent pas de décider lorsque la poursuite simultanée de tous ces objectifs est impossible; les paragraphes précédents ont montré que les ambitions des points 3 et 4 étaient souvent incompatibles. Dans une étude récente, P. Moussa [26] a même remis en cause les principales options du développement industriel. Selon lui, les industries de substitution, c'est-à-dire celles qui tendent à remplacer des produits importés par des produits fabriqués dans le pays—et notamment les industries de montage—peuvent être dangereuses : elles sont rapidement freinées par le faible pouvoir d'achat de la population et ne réalisent aucune économie d'échelle; elles déséquilibrent la balance des paiements par le poids des produits demi-finis nécessaires et par l'augmentation des importations de consommation demandées par le personnel à haut niveau de revenu de ces industries; enfin, protégées par des taxes douanières,

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[22] H. B. Lary, *Imports of Manufactures from Less Developed Countries*, New York, National Bureau of Economic Research, Columbia University Press, 1968.

[23] Voir A. Piatier, Préface au livre de P. P. Roumeliotis, *Conjoncture et commerce international*, Paris, 1972.

[24] Voir H. B. Chenery, Shishido et Watanabe, "The pattern of Japanese growth", dans *Econometrica*, janvier 1962. Voir aussi l'article de Ranis sur le Japon dans *American Economic Review*, septembre 1957 et celui de J. Power sur l'Inde et le Pakistan dans *Pakistan Development Review*, nº 3, 1962.

[25] N. Kaldor, "A model of economic growth", *Economic Journal*, décembre 1957; *idem*, *Essays on Economic Stability and Growth*, Londres, Gerald Duckworth, 1960; *idem*, "Characteristics of economic development", dans *Essays on Economic Stability and Growth*.

[26] P. Moussa, "L'Europe face à l'industrialisation du tiers monde", Conférence organisée en avril 1972 par la Commission européenne à Venise. Du même auteur : *Les nations prolétaires*, Paris, Presses universitaires de France, 1959.

elles fonctionnent à des coûts de production trop élevés. Selon une étude de la Banque mondiale, l'ensemble des pays en voie de développement a dépensé en 1965 2,1 milliards de dollars pour une production automobile dont la valeur sur le marché mondial ne dépassait pas 0,8 milliard de dollars.

32. Pour Moussa, les industries de valorisation des *matières premières* n'ont qu'un domaine limité, celui dans lequel le transport du produit transformé est plus bas que celui du produit brut (concentration de minerais, égrénage, décorticage) Sa préférence va donc aux industries fondées sur une situation favorable de la main-d'œuvre. Ne cherchant ni à réduire les importations ni à valoriser les exportations, elles tendent à profiter des salaires bas des premiers stades du développement (avant le *take-off*, nous l'avons vu) Elles peuvent tourner avec des matières premières importées et satisfaire le marché extérieur autant, sinon plus, que le marché intérieur Le Japon, pays pauvre en matières premières, a su, grâce à une main-d'œuvre abondante et habile, développer un important secteur industriel Le textile quitte les Etats-Unis pour Porto Rico et l'Extrême-Orient, il rebondit même de Hong-kong vers l'île Maurice Contrairement à ce qui se pensait et à ce qui se faisait dans les deux décennies précédentes, les pays en voie de développement tirent profit de leur avantage (quantité et prix) de leur main-d'œuvre et produisent de plus en plus pour le marché mondial International Business Machines (IBM) est l'exemple d'une société multinationale qui a réparti ses fabrications dans l'ensemble du monde L'optique et la photographie allemande a émigré presque en entier vers Singapour. Peugeot, dernier exemple, est un cas plus intéressant puisque ses fournitures à l'usine de montage tunisienne sont compensés par des achats en Tunisie, de produits (cuirs, tissus, batteries, visserie, boulonnerie) de qualité et de coûts égaux à ceux qui sont produits en France et qui sont destinés à la production globale de la firme. L'effet de création d'emplois est donc double

33 Une étape plus décisive d'intégration du facteur travail, est fournie par Aydalot[27] qui propose un modèle de croissance fondé sur la « fonction d'apprentissage » Après avoir réintégré les contraintes globales notamment emploi (existence d'un seuil minimum de chômage), financement (alternative entre accumulation et consommation) et investissement, il montre que le problème concerne l'analyse de la production et peut s'exprimer comme une recherche de la minimisation du coefficient de capital sectoriel par le choix de techniques adaptées Il s'agit, pour lui, de minimiser un coefficient de capital (où le capital est entendu comme l'expression du coût financier d'une technique) dans un univers technique où le capital est hétérogène, où les choix sont ouverts et où, à une valeur quelconque de capital, peuvent correspondre concrètement des techniques différentes et des possibilités de production également différentes

34 Si, alors, on définit l'activité motrice comme celle qui, dans une économie, accroît l'offre de facteurs rares, et l'innovation comme l'élément propagateur de l'activité motrice, on voit que le problème essentiel du développement se situe au niveau des facteurs. Si, par ailleurs, on refuse l'idée d'une adaptation automatique et instantanée du travail à toute technique, il semble que *l'élément majeur du développement est constitué* par l'aptitude à accroître la productivité du travail, la faculté d'adaptation au travail à une technique nouvelle

35. L'auteur est ainsi amené à proposer un modèle de choix dynamique des techniques, fondé sur la fonction d'apprentissage Tout travailleur n'est pas apte à travailler sans préparation sur n'importe quelle machine Selon son niveau de technicité et son expérience (*know-how*), il obtiendra une productivité très variable et qui est susceptible d'être inférieure à la productivité potentielle des équipements qui lui sont proposés Pour éviter que la productivité effective ne soit inférieure à la productivité souhaitée, il faut réaliser une adéquation entre le niveau technique du travailleur et celui de son outil En dynamique, il faut que l'équipement mis à la disposition d'un travailleur incorpore toujours la même quantité de travail La progression se fera par bonds techniques nombreux et d'importance limitée, elle remplacera la stratégie du bond technologique massif mais unique Ainsi, si rien ne permet d'affirmer que le plein emploi sera réalisé ou approché rapidement, du moins peut-on suggérer que les problèmes de l'emploi seront moins aigus qu'ils ne le sont lorsqu'on adopte des techniques hautement capitalistiques

36 Cette analyse permet aussi d'apporter une explication des phases de hausse du coefficient de capital qui accompagnent souvent les politiques d'industrialisation massive · la faiblesse des taux de croissance réels, malgré les politiques énergiques de développement qui *sont menées, provient de la baisse de l'adaptation du* travail aux techniques nouvelles qui viennent d'être installées ; la réalisation des gains de productivité est retardée. En très longue période, les phases de hausse du coefficient de capital coïncident avec les « révolutions industrielles » (hausse aux Etats-Unis à partir de 1870, baisse à partir de 1919, hausse depuis 1945) Aydalot a montré statistiquement comment les périodes de hausse rapide de l'intensité de capital engendrent des augmentations correspondantes du coefficient de capital et une stagnation ou même une réduction de la productivité; il a formalisé cette évolution dans une fonction de production dynamique non linéaire qui repose sur la fonction d'apprentissage.

37. Nul doute que cette fonction d'apprentissage, et les paramètres qui permettent de l'établir, ne fournisse de bons éléments pour les indicateurs de développement. A ce stade du raisonnement, nous pourrions suggérer une différenciation du facteur travail, analogue à celle qui a été proposée pour le facteur capital Certains auteurs ont tenté, pour [illegible] les [illegible] ion de production, de tenir [illegible] capital (âge, efficacité, [illegible]

[27] Ph Aydalot, *op cit*

expression unique : « substance capital » de Hicks[28] ou « gelée de capital » de Samuelson[29] par exemple. D'autres ont développé la fonction de production en écrivant, avec les critères m et n du capital : K_{11}, K_{12}, . . . K_{21}, ... K_{mn}, ces critères tenant par exemple à l'âge, à la durée, au degré d'usage et à l'interchangeabilité.

38. De même nous pourrions suggérer que le travail (L) subisse un traitement analogue : ou bien réduction de différentes « qualités » de travail en une expression unique, tel travail qualifié valant n fois le travail de manœuvre, l'unité de compte étant soit le salaire, soit une échelle de qualification, soit les durées d'étude, soit des enquêtes d'efficience. Ou bien différenciation dans la fonction de production des catégories de travail :

$$L_{11}, L_{12}, L_{13}, \ldots\ldots L_{21}, L_{mn}$$

39. On devrait pouvoir tenir compte aussi de l'âge et de la mobilité technique, c'est-à-dire de l'aptitude à changer d'outil.

40. Enfin le coefficient de capital devrait trouver un symétrique dans un coefficient de travail (*labour output ratio*) dont les études de productivité ont amené déjà diverses approches, exploitées dans un tout autre domaine.

Vers l'étude du développement humain

41. Dans les paragraphes précédents, l'homme n'a encore été considéré que comme facteur de production. Il faut maintenant l'introduire tout entier dans un processus socio-économique total sans la considération duquel le développement n'est qu'illusion : la multiplication du « produit » est une condition sans doute nécessaire mais non suffisante.

42. De nombreux travaux visent, depuis quelques années, à élargir le champ d'analyse : rôle de l'Etat dans le développement, économie hors marché, planification sociale, économie de la santé, de l'éducation, efforts de quantification en dehors de la sphère des prix, rationalisation des choix budgétaires (PPBS), indicateurs sociaux, analyses coûts avantages, analyses de données, économie de l'environnement : la prolifération des nouveaux thèmes est rapide; l'ensemble est aussi riche que disparate. Nous devons tenter, après mise en ordre, de dresser un tableau socio-économique homogène et cohérent. De nombreux indicateurs pourront être imaginés et articulés pour contrôler si le développement se fait bien dans le sens de l'amélioration de la vie des hommes. La démographie ne sera plus alors une discipline isolée et, à côté du nombre des hommes, de nombreuses autres mesures de la « vie » pourront être faites.

43. Le premier effort est de réconcilier l'économique et le social, trop souvent opposés. Des essais de construction de comptabilités humaines devraient ensuite faciliter l'intégration dans un système total de la comptabilité matérielle (la seule actuellement réalisée dans ce qu'on appelle trop largement comptabilité nationale) et de la comptabilité humaine. C'est le sens de nos recherches depuis plusieurs années[30].

L'intégration de l'économique et du social

44. Le dualisme du tiers monde où le secteur moderne n'a pas de contact avec le secteur traditionnel est peut-être moins grave que le dualisme des sociétés modernes où la coupure est profonde entre l'homme et son support matériel de plus en plus riche et envahissant. Le divorce entre l'économique et le social vient de la marche même du développement : l'appareil productif est plus attentif aux choses qu'aux hommes; ses résultats se mesurent en performances monétaires ou techniques, tandis que l'homme n'intervient qu'à la marge, comme facteur ou comme client. La satisfaction des besoins fait naître de nouvelles vagues de demandes tandis que les coûts de la croissance affectent non seulement les conditions de travail, la fatigue, mais même notre sommeil ou l'air que nous respirons. La pression démographique, le changement technique, la masse de la production obligent à porter attention à des éléments qui semblaient jusqu'ici en dehors de notre sphère d'activité : en quelques années, le passage de la pollution aux *nuisances*, puis à l'écologie et à la biosphère, illustre l'élargissement de la « zone » qui entre désormais dans les calculs.

45. En face de ce besoin de synthèse, d'appréhension totale du système planétaire, nos institutions et nos idées n'ont guère changé. Les économistes, notamment, ont toujours eu le souci de rétrécir leur champ d'analyse pour garder la possibilité de mesure qu'offre la monnaie. Nous proposons l'articulation suivante :

46. Ce qu'on appelle économique n'est qu'économie intermédiaire et ce qu'on appelle social représente l'économie finale. Mais cette économie finale est plus difficile à étudier parce qu'elle se situe en majeure partie hors du marché et que les unités monétaires sont souvent inadéquates à ses mesures.

47. L'économie intermédiaire, royaume des économistes atteint son apogée dans la première phase du développement matériel : elle permet d'améliorer les disponibilités en biens (notamment, alimentation, vêtement et logement) pour des populations démunies. L'attention exclusive portée à la multiplication des choses fait négliger l'homme considéré essentiellement comme « facteur de production » et là, on l'a vu, il est moins bien traité que le facteur capital. Implicitement, on pense que l'accumulation des choses va de pair avec la

[28] Voir J. R. Hicks, *Capital and Growth*, Oxford, Clarendon Press, 1965.

[29] Voir P. Samuelson, "Parable and realism in capital theory", dans *Review of Economic Studies*, juin 1962.

[30] A. Piatier, *L'équilibre entre le développement économique et le développement social*, Paris, UNESCO 1963. Articles dans *Le Figaro* (mars 1973) sur le social dans la croissance, l'articulation de l'économique et du social et la réforme de l'Etat. « Le temps et la vie économique », Mélanges en l'honneur d'U. Papi, Rome, 1972. Par ailleurs, l'auteur a été en mai 1972 rapporteur de la Conférence de l'UNESCO sur la planification du développement social — Bangkok. Sur les mêmes thèmes : cours à la Faculté de Droit et d'Economie de Paris (II) en 1972.

satisfaction des destinataires. Les déséconomies croissent avec les productions et les bilans de la croissance omettent les transferts sournois ou inconscients de charges et de coûts non comptabilisés, là où on ne les attendait pas.

48. L'économie finale doit juger du bilan d'ensemble et faire la somme des avoirs et des comptes débiteurs élargis Jusqu'ici chaque secteur visait des objectifs partiels et enregistrait des succès sans souci des « retombées » en dehors de son propre champ d'action. Le social doit à la fois faire le compte des activités en se plaçant au niveau de l'homme, client ultime et ne rien oublier des effets positifs ou négatifs à l'échelle de la biosphère.

49. Là où la mesure en monnaie n'est plus possible, il faut imaginer des mesures en temps, en effort, en satisfaction : ce qu'on appelle indicateurs sociaux ne représente encore que le début d'une difficile démarche

50 La cohérence souhaitée entre économique et social peut être obtenue par un double calcul

a) Tous les actes doivent être jugés dans une optique économique · pour chacun d'eux, une balance coût/résultat doit être établie C'est la mesure de l'efficacité et de l'opportunité · elle s'impose aussi bien pour la construction d'une usine que pour celle d'une école ou d'un hôpital, elle s'impose pour l'action sociale comme pour l'action économique, la « rentabilité » ne s'exprimant pas obligatoirement en monnaie;

b) L'optique sociale, en retour, s'applique à tout acte économique. Il ne doit plus être suffisant de décider de telle production sous le prétexte qu'elle donne un résultat positif en monnaie; il faut encore que son bilan plus global, monétaire et non monétaire, direct et indirect, laisse un surplus à la collectivité. Le produit national brut (PNB) n'est qu'un critère partiel à dépasser et, en attendant l'élaboration d'une nouvelle mesure de synthèse, des indicateurs partiels, multiples, devraient permettre le jugement.

Réseaux de relations et théorie des 3 pôles.

51. Un tableau socio-économique doit englober les différents types de relations d'une société. On peut distinguer les relations : choses/choses; hommes/choses; hommes/hommes; hommes/groupes, institutions.

52. En Inde, mes collègues ont suggéré d'ajouter les relations de l'homme avec lui-même : c'est là une catégorie oubliée dans le monde matériellement développé où l'homme, tourné vers le dehors n'accorde plus de temps, ni dans sa formation, ni dans sa vie, à la maîtrise de soi et à la vie intérieure. Il faut enfin ajouter les relations Hommes/Milieu naturel. De cet ensemble, l'économiste traite de la première ligne (choses/choses) et d'une partie de la seconde (hommes/choses) Tout le reste est en friche, éparpillé, incohérent.

53. Un premier effort d'intégration vise la comptabilité nationale : c'est entre ses grands secteurs—Secteur productif, Ménages, Etat, Etranger, que se tissent les réseaux de relations. Par routine, ces pôles et ces flux sont jugés de façon hétéroclite et, après avoir constitué un progrès évident, les comptes de la nation ne sont plus aujourd'hui qu'un mauvais bricolage. On ne peut reprendre ici les critiques des spécialistes; citons simplement l'absence de compte capital pour l'Etat et pour les ménages, l'absurde convenance de l'Etat consommateur, les traitements approximatifs de l'amortissement et des impôts

54 Une réforme peut s'amorcer autour de l'idée suivante il n'y a pas un secteur productif, mais trois Nous distinguerons (le mot « pôle » étant préférable à celui de secteur) le pôle productif au sens traditionnel, n'est productif que de biens et services de biens C'est le pôle productif matériel L'Etat est un deuxième pôle productif, sinon on se demanderait pourquoi les sociétés en entretiendraient un et augmenteraient sans cesse ses moyens Il est, en fait, producteur de services qui sont fournis sans contre-partie de paiement direct Il s'agit de services diffus, étendus à toute la collectivité ou à certains de ses membres, les coûts étant couverts grâce au budget alimenté par les impôts, taxes et emprunts L'Etat est le pôle productif hors marché Chacun de ses services exige le calcul d'une balance coût/résultat

55 Quant aux Ménages, loin d'être le réservoir de main-d'œuvre et le destinataire automatique des fruits du pôle productif matériel et le « sujet » du Pouvoir central, il est, en fait, le troisième et le plus important secteur productif A lui, en effet, incombe la création *et la gestion de la vie Par lui, peut être établi le bilan* et constaté l'échec ou la réussite de tout ce qui se fait dans la société Lui seul représente le stade final des activités, tout le reste n'étant que prestations intermédiaires

56 Ce pôle productif de vie fournit du travail aux autres pôles, rémunéré ou gratuit (service militaire par exemple) et reçoit des biens ou services contre paiement ou gratuitement Son rôle est, d'une part, de gérer le compte capital humain et d'autre part de dégager des satisfactions finales dont la croissance est le seul critère valable des efforts de développement

57. Le pôle productif humain a pour fonctions

a) D'entretenir le capital humain existant,

b) D'augmenter le capital humain — non seulement en nombre mais en intensité (éducation, santé),

c) De protéger ce capital humain, par exemple logement, vêtements, défense nationale,

d) D'organiser les relations et les communications entre les hommes (réglementation sociale, arbitrages, justice, information) et à les confier aux organismes spécialisés de son choix;

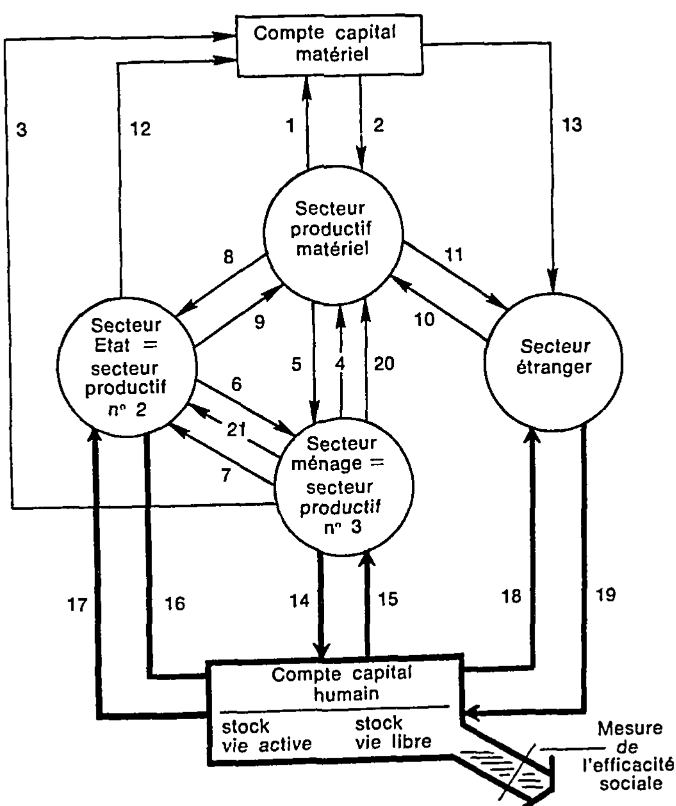
e) De dégager les consommations finales, c'est-à-dire l'ensemble des satisfactions très diverses que chaque civilisation propose comme finalité à l'existence. Les soi-disant consommations (du budget familial actuel, ou celles qui sont collectives, par le budget de l'Etat

et organismes publics) ne sont que des consommations intermédiaires.

58. Le graphique I montre, en traits pleins, comment peut être complété un schéma classique de comptabilité national : le pôle productif humain (exemple secteur Ménages) est lié au Compte capital humain par un flux analogue à celui de l'autofinancement entre pôle productif matériel et compte capital matériel; en contrepartie de cet autofinancement humain, le compte capital humain livre un flux de travail total, dont une partie sera utilisée au niveau des ménages et le reste transmis vers les autres secteurs productifs (entreprises ou Etat).

59. Ce flux de travail est prélevé sur le « stock de vie » que représente le compte capital humain; mesurable en temps, il est en partie « consommé » en pertes

Graphique I. Un schéma classique de comptabilité national.



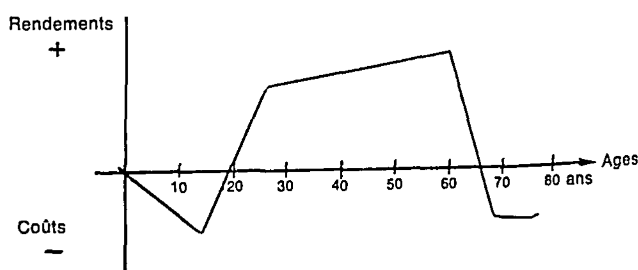
FLUX
1) Autofinancement
2) Biens d'équipement
3) Epargne
4) Biens de consommation
5) Revenus
6) Traitements et salaires publics + prestations
7) Impôts directs et cotisations
8) Impôts indirects
9) Achats par l'Etat
10) Exportations
11) Exportations
12) Excédent ou déficit budgétaire
13) Excédent ou déficit créances sur l'étranger
14) "Autofinancement" humain
15) Emploi global
16) Consommations collectives hors marché
17) Prestations de services gratuits
18) Emigration
19) Immigration
20) et 21) Travail transféré aux secteurs 1 et 2

de temps (transports, attentes, etc.) Le stock de vie s'analyse en dernier ressort comme le réservoir d'années de vie active qui sera utilisé dans le circuit économique et social) et d'années « libres » que chacun utilise selon ses propres aspirations. C'est à ce « disponible final » que doit se mesurer l'efficacité de l'organisation économique et sociale. En l'état actuel de la recherche socio-économique, il ne peut encore être saisi qu'au moyen d'indicateurs, les uns en monnaie, les autres en termes physiques, et en temps. De nouvelles techniques de calcul naîtront pour lier les tableaux en unité de temps humain et les tableaux de coût/rendement/disponibilité de ce temps, exprimés en unités monétaires. L'économiste doit s'habituer à intégrer de telles variables dans ses modèles, ainsi que d'autres, encore qualitatives telles que satisfactions culturelles ou éthiques, loisirs, distractions, épanouissement de la personnalité, harmonie sociale.

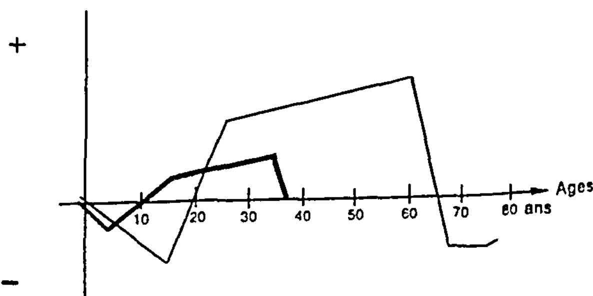
Coût et rendement de l'homme : une nouvelle approche du développement

60. Avec des techniques plus proches de celles qu'il connaît déjà, le socio-économiste peut établir une série de bilans. Pendant la durée de sa vie, l'homme passe par 3 périodes : d'abord il se fait, se forme et donc coûte; ensuite, devenu actif, il rend à la société ce qu'elle lui a donné. Enfin sur ses vieux jours, il coûte plus qu'il ne produit. Sur le graphique II (la durée de vie en abscisse, et coûts et rendements en ordonnée), on trace pour la nation, pour un groupe social ou pour l'individu moyen la courbe du solde coûts/rendements. La balance est favorable si la surface au-dessus de

Graphique II. La courbe du solde coûts/rendements.



Situation en pays sous-développé
Evolution avec le développement



l'abscisse est supérieure à celle du dessous : le développement se fait. Dans l'hypothèse contraire, il y a régression

61. Il y a plusieurs façons de concevoir le déve- [illegible] sible L'éducation accrue aggrave les coûts de la période de jeunesse mais accroît plus que proportionnellement le rendement ultérieur.

62 Le progrès social est en amont (les investissements dans l'homme augmentent son rendement) et en aval (tout progrès de production se traduisant par une amélioration du niveau de vie) L'optimum de croissance peut tenir compte notamment de l'allongement de la vie, de l'allongement de la scolarité, de l'âge de la retraite et du travail féminin Les effets comparés de l'augmentation du nombre des hommes (*human extensive*) et de l'amélioration de l'efficacité d'un nombre constant (*human extensive*) peuvent être dégagés. De nouveaux indicateurs spécifiques peuvent éclairer cette nouvelle forme de gestion socio-économique des sociétés.

LES INDICATEURS DE DÉVELOPPEMENT

Définitions, qualités et types d'indicateurs

63. Jusqu'ici, les indicateurs ont été principalement utilisés en conjoncture : leur but est alors de saisir les phases des fluctuations, de dégager les tendances longues, de connaître, si possible à l'avance, les points de retournement.

64. Pour le développement, les qualités d'anticipation et d'amplification sont moins nécessaires pour les indicateurs ils doivent enregistrer un mouvement et contrôler les réalisations par rapport aux programmes. Les exigences seront également moindres pour la périodicité les indicateurs pourront être mensuels, trimestriels ou même annuels.

65. Les objectifs sont de relier l'économique au social et au démographique et surtout de remplacer l'indicateur quasi unique utilisé jusqu'ici, le PNB par tête en monnaie nationale, ou en dollars pour les comparaisons internationales, par des batteries d'indicateurs, plus représentatifs de la réalité, c'est-à-dire capables de saisir les aspects multiples du développement. Il n'est pas exclu d'utiliser des indicateurs qualitatifs à côté des indicateurs statistiques classiques

66 Ce n'est pas le lieu de faire ici la critique de la mesure du développement au moyen du PNB par habitant Il suffira de rappeler quelques inconvénients particulièrement graves :

a) Des activités dominantes, par exemple, l'extraction pétrolière, peuvent augmenter le PNB par tête au-delà du changement réel du revenu national. Dans l'échelle internationale, Koweït passe avant les Etats-Unis et le Venezuela avant tous les autres pays d'Amérique Latine ..;

b) L'importance de l'autoconsommation dans les pays en voie de développement où la population rurale dépasse encore souvent 75 p 100 du total, aggrave les marges d'erreur, en raison de la méconnaissance des niveaux de vie réels et de l'arbitraire dans le choix des prix utilisés pour chiffrer autoconsommation et autoéquipement,

c) Dans le secteur « économie de marché », l'hétérogénéité des prix rend les opérations de consommation illusoires les prix des mêmes produits varie considérablement selon les lieux, les groupes sociaux, les structures de demande, les types de transaction l'éventail des prix est bien plus ouvert que dans les pays développés;

d) L'évaluation dans le secteur hors marché est aléatoire et entraîne des distorsions considérables. Les services des administrations, notamment, sont estimés dans des conditions qui excluent toute possibilité de comparaison,

e) Les coûts externes, *nuisances* par exemple, ne sont que très partiellement recensés et leur évaluation monétaire est incomplète et contestable De plus, ce qui est comptabilisé comme gain du développement n'est, pour partie que compensation des inconvénients du développement la croissance est toujours surestimée et dans des proportions inégales selon les pays Les coûts de la congestion urbaine s'inscrivent, par exemple, comme des progrès dans le PNB Autre exemple théorique si un aliment nouveau mais toxique est mis en vente, il augmente le PNB, non seulement par ses ventes mais aussi par l'activité médicale accrue du fait de la morbidité,

f) Les expressions en une monnaie commune comme le dollar, entraînent de nouveaux biais, le taux de change n'étant pas représentatif du pouvoir d'achat des monnaies Milton Gilbert[31] a dégagé les techniques statistiques — hélas très lourdes — qui permettraient d'éviter cet inconvénient

67. Dans ces conditions, le PNB n'apparaît plus que comme un indicateur parmi les autres et même plus, comme le meilleur. Selon nous il ne faut pas chercher à le remplacer par un autre indicateur synthétique unique mais par des batteries d'indicateurs choisis en fonction des points qu'il s'agit d'éclairer Dans ces conditions, on conçoit qu'à côté des indicateurs monétaires, des indicateurs non monétaires (en unités physiques, en temps, indicateurs qualitatifs, par rangs, etc.) soient utilisés.

68 On distinguera aussi des indicateurs d'objectifs et des indicateurs de moyens Par exemple l'élévation du niveau de vie pourra être considérée comme objectif et alors, l'augmentation du PNB, de la production alimentaire et de biens de consommation comme moyen Si l'augmentation de la production est prise pour objectif partiel, les moyens seront, en particulier, l'inves-

[31] Voir M Gilbert et I B Kravis, *Etude comparative des produits nationaux et du pouvoir d'achat des monnaies*, Paris, organisation de coopération et de déve[illegible] ques, 1955.

tissement et l'assistance technique. En poussant plus loin l'analyse, on doit se demander pour le niveau de vie par exemple : quel niveau de vie ? cherchant à imiter celui déjà atteint ailleurs ou établi selon des normes spécifiques au pays ? avec ou sans changement culturel ? De nouveaux indicateurs peuvent alors intervenir pour préciser l'analyse.

Indicateurs, niveaux de développement et situations démographiques

69. Etablir les mêmes groupes d'indicateurs pour tous les pays serait une erreur. Tout au plus peut-on concevoir une batterie assez réduite qui permettrait les comparaisons et les classifications sur des problèmes particuliers. Vouloir les mêmes indicateurs pour l'ensemble du tiers monde serait aussi dangereux. La solution est plutôt dans l'établissement préalable d'une typologie des pays ou des zones, en fonction du niveau de développement et de la situation démographique.

70. Pour la population, divers indicateurs devraient permettre de suivre l'évolution de la pression et de signaler le point critique; notamment, des rapports hommes/surface utile, hommes/aliments, hommes actifs agricoles/volume d'emploi agricole.

71. Il est évident que, contrairement à une idée répandue, la pression démographique est très inégale dans le monde, ce qu'on ne voit pas en utilisant seulement l'indicateur « taux de croissance démographique » qui, lui, est assez homogène dans tout le tiers monde (entre 2,5 et 3). Même avec ce taux, il y a des régions qui ont encore un répit d'une ou deux générations (Afrique noire ou Amérique latine) alors qu'en Asie du Sud-Est ou dans le monde islamique (du Maghreb au Pakistan) la situation est, dès maintenant, difficile.

72. Les notions de surpeuplement, sous-peuplement, optimum de population sont relatives : le jugement est fonction du niveau de développement. Le Japon est passé, peut-on dire en schématisant grossièrement, par 3 phases de surpeuplement : dans les temps anciens, avec une économie très traditionnelle et sans équipements, la solution avait été l'infanticide, la vente des filles et le suicide des paysans. Entre les deux guerres, à un autre niveau d'équipement, on a cru possible de recourir à une solution extensive, celle de l'espace vital et des conquêtes. Après la deuxième guerre, le surpeuplement a été dominé grâce à une solution intensive, capitalistique, liée à une politique de freinage de la natalité.

73. Aujourd'hui, l'Indonésie peut se servir de la méthode spatiale (migrations de populations vers des îles peu peuplées) en même temps que des 2 autres. L'Inde, elle, n'a que la voie physiologique et la voie capitalistique. Plusieurs ratios construits avec diverses expressions de K et de L devraient permettre de suivre les possibilités offertes par diverses formes de développement. Wagemann [32] et Sauvy [33] avaient montré la voie.

[32] E. Wagemann, *Alternationsgesetz der wachsenden Bevölkerungsdichte*, Institut für Wirtschaftsforschung, Berlin, 1936.
[33] A. Sauvy, *Traité de démographie; essai de biologie sociale*,

74. Les niveaux de développement sont à considérer dans une autre optique. Pour les pays les moins développés, un indicateur indispensable est celui du degré de monétarisation et on aura à en rechercher les expressions possibles, par exemple : masse monétaire par habitant, stades de transaction successifs par produits, paiements scripturaux/transactions totales, encaisses liquides/encaisses fiduciaires. Il est ridicule de classer, comme on le fait encore, les pays les plus défavorisés autour de 100 dollars par habitant, en tirant des conclusions, d'écarts de quelques dollars autour de ce chiffre. On pourrait fort bien concevoir un paradis à 0 dollar par tête.

75. Des indicateurs en nature, sur les consommations, les emplois du temps, sont souhaitables. Les comptes de villages [34], expression élémentaire à partir de laquelle on pourrait concevoir de bâtir un nouveau type de comptabilité nationale, sont à généraliser et leur méthodologie pourrait faire l'objet d'une réunion internationale.

76. Une des premières tâches est également de mesurer le travail et les outils. Le travail se mesurerait avec des indicateurs de temps par tâche (par exemple pour labourer un hectare), avec des indicateurs de l'investissement travail — trop peu étudié et trop peu pratiqué dans des pays où la main-d'œuvre disponible est pourtant la grande richesse inemployée — enfin avec des indicateurs de « multiplicateurs de travail ». Dès les premiers stades de développement il importe de connaître l'équipement en termes de répartition du temps : pour faire des outils et pour l'emploi des outils, (artisanat des outils à main, mécanisation des tâches). Un bon indicateur synthétique est celui de l'énergie mécanique utilisée : il ne s'agit pas de statistiques énergétiques habituelles (total des productions + importations des différentes sortes d'énergie, exprimées en équivalent pétrole ou charbon) mais uniquement de l'énergie mécanique, si possible en tenant compte du rendement des divers moteurs [35]. Un tel indicateur serait valable pour tous les stades du développement.

77. Il y a longtemps déjà, nous avions proposé [36] une division du monde en six stades :

1) Pays (ou zones) dits attardés, économies traditionnelles encore à l'état pur;

2) Pays encore en voie de développement ou peu développés ou n'ayant pas décollé;

3) Pays en cours de décollage;

4) Pays ayant amorcé le développement;

[34] R. Mukherjee, *Six Villages in Bengal*, Calcutta, 1963.
[35] Voir par exemple G. Gabrielli, *Considerazioni sul Grado di Utilizzazione dell Energia Richiesta nei Veicolo per Passaggeri e Merci di tutti i Tipi, in rapporto alla loro Capacita netta di Transporto Convegno Internazionale delle Communicazioni*, Genève, octobre 1972 et aussi A. Piatier, « Inégalités économiques et démographiques de développement », *Encyclopédie française*, tome XI, le paragraphe sur les « Esclaves mécaniques ».
[36] A. Piatier, *Encyclopédie française*, en particulier, mise à jour en 1967 du paragraphe sur « Pays riches et pays pauvres ».

5) Pays bientôt développés;

6) Pays développés

78. Une analyse arborescente avec un nombre réduit de critères avait fait apparaître ces groupes de façon significative. Mais une analyse plus poussée permettrait sans doute d'affirmer cette typologie. Contrairement à l'opinion répandue selon laquelle l'écart entre pays développés et en voie de développement s'accroît, on voit que l'écart entre les groupes 4 et 5 d'un côté et 6 de l'autre se réduit, assez rapidement même.

79. A partir de la deuxième catégorie (pays n'ayant pas encore décollé) de nouveaux indicateurs sont concevables Là une réforme statistique profonde paraît indispensable : l'économie étant dualiste, la statistique doit l'être aussi [37]. Voici quelques propositions que nous avions faites il y a quelques années

80. S'il est parfaitement légitime de déplorer le dualisme et de chercher à le faire disparaître, il faut tenir compte de son existence et disposer d'un double système de statistique : en effet, la statistique classique ne peut s'appliquer qu'au secteur moderne et des techniques différentes doivent être envisagées pour le secteur traditionnel où le rôle des sociologues et des ethnologues doit être prépondérant L'effort statistique doit porter d'abord sur les concepts de base · choix des unités, nomenclatures Trop souvent on transpose dans le secteur traditionnel des concepts statistiques inadaptés (chômage par exemple) ce qui enlève toute valeur aux observations chiffrées Il faut de plus avoir une dynamique des concepts pour adapter les observations aux changements successifs des mentalités et des cadres de la société. Des indicateurs tels que le degré de monétarisation ou la mobilité des personnes (nous avons fait des tentatives intéressantes en mesurant la distance entre lieu de naissance et lieu de mort, et pour les mariages, distance entre lieu du mariage et lieu de naissance des conjoints, pour les enfants, lieu de naissance et lieu d'origine des parents), ou enfin le rayon des échanges

81 Ainsi le secteur moderne serait considéré comme une entité statistique autonome et c'est à lui que devrait se borner la construction d'une comptabilité nationale au sens où nous l'entendons dans les pays industrialisés. Il ne suffit pas de mettre le secteur agricole à part, il faut exclure aussi les activités urbaines traditionnelles et donc une partie de l'artisanat et les « petits métiers » Le secteur moderne ne comprendrait qu'un nombre limité d'unités productives nettement identifiées et la population qui en dépend, ainsi que celle dont les modes de vie sont déjà profondément changés.

82. Le rapport des populations composant les deux secteurs serait un très bon indicateur. Quant au secteur traditionnel, il apparaîtrait marginalement dans une comptabilité nationale élargie, mais avec des données réduites à des flux d'importations (ventes du secteur moderne) et des flux d'exportations (achats au secteur traditionnel)

83. Dans ce système statistique, la population ferait aussi l'objet de deux présentations séparées et des recherches spéciales devraient faire apparaître chaque année l'importance des effectifs (avec classement par sexe, âge et région d'origine) passant d'un secteur à l'autre La population en transit, quittant le secteur [illegible] extra-coutumière), serait comptée à part.

84 A partir du moment où le décollage est commencé, de nouvelles batteries d'indicateurs doivent s'ajouter aux précédentes on suivra avec attention les salaires par secteurs, l'habitat et son équipement, l'évolution de la cellule familiale (composition, taille, localisation) Un système complet d'indicateurs se construit ainsi peu à peu, au fur et à mesure de l'expansion.

Compléments à apporter aux indicateurs classiques du développement

Indicateurs d'emploi

85 Il faut étudier les rubriques suivantes

Situation générale du marché du travail (offres et demandes non satisfaites),

Population excédentaire (chômage, non-emploi, sous-emploi, faux emploi),

Créations de travail dans l'industrie, dans le commerce moderne et dans les emplois administratifs,

Durée du travail et effectifs employés,

Taux de féminisation des emplois non agricoles,

Exode rural, nouvelles arrivées dans les villes.

Indicateurs du niveau de vie

86. On rappellera ici les travaux de l'Organisation des Nations Unies sur les niveaux de vie et les travaux, plus larges que cette étude sur les indicateurs sociaux [38]

Revenus :

Evolution des revenus globaux, par activité et groupes sociaux;

Salaire horaire ou hebdomadaire moyen dans l'industrie et le commerce,

Composantes de la fonction d'apprentissage;

Journées payées au titre des congés;

Age minimum d'accès aux emplois;

Nombre de titulaires de revenu par famille;

Impôts, taxes, cotisations sociales et autres : salaire net.

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[37] Voir A. Piatier, Introduction générale de l'ouvrage collectif publié sous le pseudonyme M Petit-Pont, *Structures traditionnelles et développement*, Paris, Editions Eyrolles, 1968.

[38] *Rapport sur la définition et l'évaluation des niveaux de vie du point de vue international* (publication des Nations [illegible] *Political Economy*, 1950 J. [illegible] Paris, 1971.

Nutrition :

Disponibilité nationales et par tête (en calories, en protéines), comparaison avec les besoins;

Pourcentage des dépenses alimentaires dans les dépenses de consommation.

Autres postes de dépenses :

Logement, équipement du foyer, habillement, soins personnels, en pourcentage des dépenses totales;

Densité d'habitat par pièce; pourcentage eau, électricité, bain par logement;

Dépenses publiques pour services sociaux; sécurité sociale : importance des prestations, totales et par habitant;

Indice de consommation par habitant; propension à consommer;

Equipement par ménage ou par habitant en radio, télévision, automobile, téléphone, réfrigérateur et autres;

Evolution des budgets temps[39];

Voyages, vacances, tourisme intérieur;

Equipement (et activité) cinémas, théâtres et autres distractions;

Indicateur de dépense et de pratique sportive[40];

Dépenses de loisirs, fêtes familiales et populaires, dons. (Un indicateur pourrait être le nombre de jours de fêtes/réunions familiales et l'estimation de la dépense de repas par personne ces jours-là, comparée à la dépense du repas ordinaire.)

Epargne, encaisses liquides, thésaurisation; propension à l'épargne.

Indicateurs d'investissement humain

87. En plus des statistiques démographiques classiques, voir :

Education :

Pourcentage d'analphabètes dans la population totale et par sexe;

Pourcentage des enfants d'âge scolaire dans l'enseignement primaire, secondaire, supérieur;

Formation des adultes (effectifs et pourcentage population active);

Taux scolaires en fonction de la catégorie socio-professionnelle du père;

Taux de réussite aux examens en fonction de la catégorie socio-professionnelle du père;

Evolution du nombre de boursiers;

Comparaison de la structure professionnelle par génération;

Evolution du nombre des enseignants dans population active;

Part du PNB consacrée à l'éducation.

Santé :

Espérance de vie, à la naissance, à 20 ans, à 60 ans;

Causes de décès;

Mortalité périnatale, infantile et par groupes d'âges;

Nuptialité et fécondité par âges;

Taux d'accroissement global et naturel de la population;

Nombre de lits d'hôpitaux;

Nombre de médecins, pharmaciens;

Dépenses de santé par famille;

Dépenses de santé sur fonds publics;

Nombre moyen d'enfants par famille;

Diffusion du planning familial;

Proportion des personnes âgées dans population totale (par sexe);

Proportion des actifs de plus de 65 ans;

Proportion des moins de 18 ans dans population totale;

Proportion des actifs de moins de 18 ans;

Personnes âgées vivant dans la famille et personnes âgées à la charge de la société;

Handicapés, inadaptés, malades mentaux (nombre et coût de chaque catégorie).

88. Un bon indicateur synthétique de l'état sanitaire[41] semble être la différence de poids des futures mères entre le début et la fin de la grossesse. De même le poids des nouveaux-nés. Mais, ces deux indicateurs perdent leur valeur dans les pays développés lorsque les prescriptions médicales tendent à limiter ces poids pour faciliter l'accouchement.

Indicateurs de l'organisation économique et sociale générale

89. Sous cette rubrique, seraient groupés d'une part des indicateurs économiques relatifs aux finances publiques, à la monnaie, aux disponibilités en devises et à la balance des paiements, des indicateurs de prix (si possible provenant d'observations séparées en de nombreux points du territoire, ville et campagne), et des indicateurs mesurant le degré d'information[42] de participation, de cohésion sociale (conflits du travail, manifestations, suicides, délinquance, par exemple). Sur ces points, des indicateurs non chiffrés sont recommandés[43].

Les indicateurs négatifs

90. Le grand tableau socio-économique de contrôle du développement ne serait pas complet s'il ne com-

[39] Voir les travaux de l'Institut international de sociologie de Vienne sur les comparaisons des budgets temps de quelques pays.

[40] Voir l'enquête que nous dirigeons en ce moment au Centre d'étude des techniques économiques modernes, à Paris.

[41] Voir à ce sujet les indicateurs de santé du Dr. Ruff dans la revue *l'Evolution médicale*, 1970.

[42] Voir A. Piatier, *Radioscopie de l'Europe*, enquête de consommation sur 16 pays européens, voir Préface et questions relatives au degré d'information des personnes interrogées, sur l'Europe et sur les productions des pays européens.

[43] Parmi les nombreux indicateurs qualitatifs qui existent déjà, citons celui de G. Tagliacarne qui dans son enquête de conjoncture de la revue *Sintesi Economica*, avait une excellente idée du climat social en posant aux entreprises la question : Qualité des rapports entre la direction et les travailleurs?

prenait aussi des indicateurs négatifs : par cette expression, nous entendons toutes variables permettant de suivre l'évolution de facteurs défavorables dans le développement S H Alatas a attiré l'attention sur des phénomènes peu étudiés tels que la corruption, la fraude, le parasitisme et le népotisme[44] et il a donné quelques éléments de méthode pour suivre leur évolution dans le temps.

91. Il faudrait ajouter les pollutions et *nuisances*: des indicateurs de la pollution des eaux (elle est très générale et sous forme bactérienne avec le sous-développement, et elle devient chimique avec le développement) et de l'air Des indicateurs de bruit, de l'érosion et de la dégradation du milieu naturel, du déboisement, etc., sont nécessaires. On peut encore y ajouter diverses formes d'agression qui croissent avec le développement : accidents du travail, accidents de transport, délinquance violente On pourrait encore citer notamment des indicateurs d'alcoolisme, de consommation de drogues et de stupéfiants, de morbidité et de mortalité cardiovasculaire et par cancer.

92. Les coûts de la lutte contre les *nuisances* (égouts, stations d'épurations par exemple) pourraient être comptabilisés à part et regroupés dans une batterie d'indicateurs.

Indicateurs et espace économique

93. Les données concernant des totaux ou des moyennes nationales sont insuffisantes : il faut que l'information sur le développement ait un certain relief spatial. Les données devront être éclatées par régions, avec, aussi, la distinction milieu urbain-milieu rural.

94. Trop souvent, le développement tend à congestionner la ville métropole et à laisser les villes petites et moyennes dans un état de sous-développement; des indicateurs devraient suivre, pour une hiérarchie urbaine, les conditions dans lesquelles les villes s'équipent et deviennent capables d'assurer les fonctions qui leur incombent[45] Souvent aussi, ce qu'on appelle statistiquement, d'après le nombre des habitants, « ville », n'est, en fait que villages hypertrophiés. Dans le même esprit, l'observation de la polarisation exercée par les villes doit donner des indicateurs utiles. L'attraction commerciale, administrative, éducative, sanitaire, culturelle des agglomérations peut être considérée comme un important facteur de développement [46].

Conclusion

95. Cette approche socio-économique liant démographie et développement n'est pas sans poser le problème des finalités de la croissance. Peut-être que l'optique, prise ici, évite de tomber dans les pièges où ont été pris le Club de Rome et le Massachusetts Institute of Technology.

96. Stopper la croissance apparaît comme une provocation dans tous les pays en voie de développement. Certains y voient une tentative des pays riches pour garder leur avance et donc leur pouvoir de domination Nous y voyons plutôt la manifestation de craintes, souvent formulées dans cette partie du monde qui a su conduire valablement son développement matériel et l'a confondu avec le développement véritable au XIX[e] siècle, la prévision de Malthus — entre les deux guerres, les théories de la maturité, aujourd'hui la croissance zéro, ont la même origine géographico-ethnico-culturelle · ces craintes sont probablement aussi une « maladie du développement » Malgré les erreurs de conceptualisation et de calcul que ces travaux contiennent, malgré le luxe technique des moyens mis en œuvre, il est certain qu'ils donnent une opportune mise en garde La croissance doit être repensée et le modèle des pays industrialisés ne peut plus être, comme on le croyait autrefois, considéré comme le meilleur Il faut désormais trouver de nouvelles voies de développement, le tiers monde ayant à dégager des solutions originales dans lesquelles les coûts de la croissance seront moins élevés et où une comptabilisation meilleure sera faite des avantages réels de toute action L'intégration de l'homme (sous forme des facteurs sociaux — ou sous forme de comptabilité humaine) doit aboutir à une coordination entre nombre des hommes et volumes de leur production

97 La croissance sera probablement infléchie vers les services et la conservation du milieu naturel Mais ces objectifs ne sont opportunément proposables que lorsque les besoins essentiels nutrition et santé, sont satisfaits La discussion entre optimistes (20 milliards d'humains à l'aise sur la planète) et le pessimiste continuera longtemps encore Pendant ce temps il faudra agir et, le nombre des hommes étant aujourd'hui une donnée, il faudra moduler la croissance humaine la plus faible possible avec une croissance des produits orientée vers les besoins essentiels et calculée aux moindres coûts humains et à la moindre dégradation du milieu naturel.

98. Malgré les coûts croissants de la vie, avec le nombre des hommes et les progrès de la technique la croissance devra donner l'apport net à l'individu le plus grand possible.

99. Enfin la croissance de demain pourra [illegible] longtemps encore des emplois [illegible], une de [illegible] tâches étant de compenser [illegible] les déséconomies de la [illegible]. [illegible] espérer que la recherche [illegible] loppement intégrant [illegible] la formation d'une [illegible] mise en place d'[illegible]

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[44] S H Alatas, *Sociology of Corruption*, Singapour.

[45] Voir A Piatier, « Le développement des villes et le développement des villages dans *Civilisations* (Bruxelles) n° 1/2, [illegible]

ECONOMIC-DEMOGRAPHIC MODELS *

United Nations Secretariat **

1. The interlinking relationships between economic and demographic variables were important to the classical economists; these relationships, moreover, played a central role in their discourses. Classical models included not only relationships explaining the impact of demographic variables on economic trends, but relationships explaining the impact of economic variables on demographic trends. These models, thus, although structurally simple, defined a complete economic-demographic system. The models that were developed during the post-classical period, however, considered the economic and demographic behaviour to be determined, to a large extent, independently of one another. In neo-classical models, for example, demographic variables, when they are incorporated into the models, were assumed to be determined exogenously. On the other hand, the explanation of demographic behaviour, as Theodore Schultz [1] recently noted, was left to demographers, sociologists and biologists. In recent years, a new interest has again arisen among both economists and demographers in the study of the interlinking relationships between economic and demographic variables.

2. This recent interest derives, to a large extent, from the serious economic and demographic problems facing the contemporary developing countries. As is well known, the rates of growth of population in almost all the developing countries have accelerated to previously unknown levels due to the rapid decline in mortality without any substantial changes in fertility. These accelerating trends, moreover, are experienced in most of these countries in spite of existing very low levels of living; in some of the countries, the population densities, also, are high. The existing models, classical as well as neo-classical, fail to explain fully these contemporary economic and demographic trends.

3. The need for a better understanding of these relationships is even more urgently felt by the policy-makers of developing countries. These policy-makers, who in recent years have come to play an increasing role in the management of economies of the developing countries, are anxious to evolve policies which will raise levels of living from the current very low levels. Because of the rapidly increasing growth in population, in evaluating the impact of these policies on the developmental process, policy-makers must take into consideration the impact of these policies not only on the output of goods and services, but on population trends; and then, the secondary impact of population trends on the output of goods and services.

4. The purpose of this short paper is to examine critically the economic-demographic models that have been proposed in the literature; and then briefly to examine the extent to which these models promote understanding of the interaction between economic and demographic trends in contemporary developing countries. Economic-demographic models in this context are interpreted broadly as an expression, in a systematic manner, of a set of interlinking relationships between economic and demographic variables. Such an expression need not necessarily be expressed formally in symbolic form or as a set of equations; an analyst could take into consideration, for example, the interlinking relationship in his analysis without such a formal expression. However, an explicit expression does help in the analysis: when analysing the impact, for example, of alternative policies, it would help to distinguish between cause and effect and between assumptions and conclusions.

5. The models that are discussed in the literature are often not complete economic-demographic models, which include causal relationships in both directions —relationships expressing the impact of economic variables on demographic variables, as well as that of demographic variables on economic variables. Many are partial models; they are restricted to explaining only some part of the economic-demographic system. In demographic literature, a distinction is often made between analytical (or theoretical) models and empirical models. The difference logically is that an analytical model is a deductive system, whereas an empirical model is an inductive system. The Leiberstein-Nelson model of critical minimum effort is a good example of a theoretical model, and the Coale and Hoover model for India an example of an inductive system.

6. Recent demographic research includes both macro- and micro-demographic models. The macro-models relate to relationships between aggregate variables representing the whole economy and they discuss the

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[1] Theodore W. Schultz, "The value of children: an economic perspective", *Journal of Political Economy*, vol. 81, No. 2, part II (March/April 1973), pp. s2-s13.

interrelationships between economy-wide aggregate economic and demographic variables, while micro-models relate to the behaviour at the economic unit level. For example, micro-models of fertility discuss the fertility behaviour at the household level. Both these types of models are briefly discussed However, before proceeding to discuss these models, a brief comment is made by way of a digression which it is believed would help to place the contemporary demographic picture facing the developing countries in historical perspective. This is done by comparing and contrasting the recent trends in developing countries with what has been referred to by demographers as the "demographic transition" in the developed countries.

7. By "demographic transition", the demographers mean the transition in the developed countries from a situation of high birth and high death rates to one of low birth and low death rates. In countries of early industrialization, this process of demographic modernization was spread over a few centuries. Prior to the industrial revolution, these countries were characterized by high death and high birth rates, with relatively low population growth; the birth and death rates were around 35 per 1,000 and the rate of growth of population around 0 4 per cent per annum.[2] Beginning in about the early eighteenth century, owing to reasons related largely to improvements in conditions of living —better nutrition, better public health and so on—the death rates in these countries began to decline. This decline in death rates continued, without any noticeable decline in fertility, well into the nineteenth century, when, in addition to mortality, fertility, too, showed a declining trend By the beginning of the twentieth century, these countries had moved to low mortality, low fertility rates, and had completed the "demographic transition". However, population growth in the developing countries at the beginning of the twentieth century was estimated at around 0.3 per cent per annum.[3] In a number of developing countries, mortality began to decline slowly in the first part of this century, but it was only after the end of the Second World War that the decline in mortality in these countries gathered momentum. Since then, death rates have declined rapidly; in a few of these countries death rates have already reached levels comparable to those of the developed countries

8. This first phase of demographic modernization, which sometimes took the developed countries as much as a few centuries, has taken the developing countries only a few decades. Of course, the result of the rapid decline in mortality combined with high and stable birth rates has been the unprecedentedly high rates of growth of population. A number of countries, in recent years, have reached rates of growth considerably higher than 3 per cent per annum. The questions relating to this first phase—the economic and non-economic causes of this phase of demographic modernization, and its impact on economic change—have not yet all been answered. The more urgent and difficult questions that the demographers are asking, however, relate to the next phase; how demographic trends would respond in the future, whether fertility trends can be expected to decline, and if so, how soon and what factors would influence such a decline, and what the economic impact of these demographic changes would be

Classical models

9. One of the oldest recognized models relating economic and demographic trends is the familar model proposed by Malthus and the classical economists. This model in its simplest form[4] postulates two principal relationships one, the impact of economic trends on demographic behaviour; and the other, the reverse relationship of the impact of demographic trends on economic behaviour. The first relation postulates that rising levels of living (from subsistence levels) would tend to increase population through a decline in mortality rates. It is further postulated, however, that these increases in levels of living and in population cannot both be sustained because of another relationship, which states that, since population has the potential exponential rate of growth while food could [illegible] population would [illegible] causal relation- [illegible] checks, would [illegible] are two crucial variables in this model one demographic—the mortality rate; and the other economic—the supply of food. It is the change in mortality rates that determines the population change [illegible] of food [illegible] termines levels of living [illegible] implied that fertility [illegible] would not change and [illegible] continue at their [illegible] and that land [illegible] factor in the production of food [illegible] could be [illegible] the pre-industrial [illegible] generally [illegible] tions of the [illegible] of the Western [illegible] revolution [illegible] mortality [illegible] while the [illegible] level [illegible]

[2] Angus Maddison, *Economic Progress and Policy in Developing Countries* (London, George Allen and Unwin, 197[illegible] p 254

[3] Harry M Raulet, "Family planning and population control in developing countries", *Demography*, vol 7, No 2 (May 1970), p 214.

[4] [illegible]

(together with other components of levels of living) included, as it turned out, not only land, but capital and technical progress. It was this last-named factor, technological progress, with its impact on the productivity of land and labour and on total output, that the classical economists were least able to foresee in their analysis. It also turned out, beginning about the middle of the nineteenth century, that, in addition to the decline in mortality rates, fertility rates, too, began to show a declining trend. The discussion of the relevance of this model to contemporary developing countries is discussed later in this paper.

10. Although much of the economic theorizing in the past 150 years considered population and its components exogenous to their analysis, a few models have incorporated population as an endogenous variable. One such model, relating to the theory of economic development, is that associated with Leibenstein and with Nelson.[5] This model describes the possibility of a low-level equilibrium trap at subsistence level in low-income countries. The relationships of the model have some resemblance to the Malthusian model. The mechanics of this model, however, arise from the shapes of the curves of the rate of growth of population and rate of growth of income, each of which is defined as a function of *per capita* income. It is postulated that the curve of the rate of growth of population intersects and lies above the curve of income; or, in other words, in the neighbourhood of subsistence levels of income, for changes in *per capita* income population grows faster than income. Beyond a certain critical level, however, the curve of the rate of growth of population turns downward and falls below that of income. Given these specifications of change of population and income, it can easily be demonstrated that *per capita* income, at the subsistence level, constitutes an equilibrium trap, and that the only possibility of escaping from this trap is for *per capita* income to "jump" beyond the critical level. The working of the Leibenstein-Nelson model, is, in a sense, a little mechanical in that the demographic and economic reasons for the specific nature of the shapes of the curves are not given. For example, why the rates of growth of population should turn downwards, whether through a decline in fertility or through a slowing-down in the rate of decrease of mortality, is not made clear. The recent experience of developing countries indicates that these relationships are at least not universally satisfied.

Investment-oriented models

11. There is a noticeable shift in emphasis of economic-demographic models developed since the late 1950s. The relationships in the models developed prior to this period—Malthusian and Leibenstein-Nelson—were postulated as natural laws or behavioural relations with an implied inevitability about their outcome; there were few suggestions of the possibility of change in these relationships through national policies. The new models emphasized the possibility of change of population trends through policies developed to suit broader national goals and objectives. Further, in the models of this later period, the emphasis shifted from mortality to fertility as the critical demographic variable. The declines in mortality rates were, by this time, expected to fall as a consequence of health policies, which aroused little controversy and were generally welcome; the important demographic variable that remained to be explained, therefore, was fertility.

12. One of the earliest indications of this new trend is a paper written by Enke[6] in 1957. This paper points to the importance of recognizing the relationships between economic and demographic variables in the analysis of development policy of the developing countries. If the objectives of national policy, he argues, is to raise *per capita* income then such analysis should be concerned not only with policies whose goal is increasing the numerator income, but with the impact of those policies on the denominator population. To illustrate the importance of the interaction between economic and demographic variables, he considers two alternative development policies: one, investment in industrialization and urbanization; and the other, investment in agricultural expansion. In addition to the two sets of economic relationships relating investment patterns and production functions associated with the two policies, he also assumes two sets of demographic parameters, the urban population having a slower rate of population growth, arising mainly through a lower birth rate in the urban regions. The two policies, therefore, resulted not only in two alternative patterns of output, but in two patterns of population growth. Although the *per capita* income resulting from investment in agriculture turns out to be higher in the immediate future, in the long run (by 1990), the *per capita* income through investments directed towards urbanization and industrialization turns out to be higher. Even though the specific parameters used in his analysis may be questioned, there is little disagreement about the endogenous introduction of demographic variables into the model. At this stage, his concern was not direct demographic investment, but the indirect impact of economic policy on demographic behaviour.

13. Before long the emphasis of models shifted from indirect impact of national policies for demographic change to the direct impact through demographic

[5] Harvey Leibenstein, *Theory of Economic-Demographic Development*, editorially sponsored by Office of Population Research, Princeton University (Princeton, New Jersey, Princeton University Press, 1954); *idem, Economic Backwardness and Economic Growth: Studies in the Theory of Economic Development*, University of California, Institute of Industrial Relations, Research Program Series (New York, John Wiley & Sons, 1957); and Richard R. Nelson, "A theory of the low-level equilibrium trap in underdeveloped countries", *American Economic Review*, vol. XLVI, No. 5 (December 1956), pp. 894-908.

[6] Steven Enke, "Speculations on population growth and economic development", *Quarterly Journal of Economics*, vol. 71, No. 1 (1957), pp. 19-35.

investments. The role of models shifted to estimating, quantitatively, the economic impact of a given fertility change. Two broad methodological approaches have evolved. One, the cost/benefit approach, is very similar to the methods used to evaluate profitability of public investment projects The other, with the use of macro-economic growth models, attempts to evaluate the trends arising in *per capita* income from alternative patterns of population trends A large literature has evolved around these two approaches. Because of the importance given to these methods, and also because they both still seem to have some difficult conceptual problems, they are discussed below in some detail.

14. However, before proceeding to discuss the specific cost/benefit models used to evaluate the net social gains arising from demographic projects, it would be helpful to make a few general comments on broader issues related to cost/benefit methods. Cost/benefit methods, although originally developed to evaluate the feasibility of private investment projects, have, in recent years, been modified and used to evaluate the feasibility of public investment projects. Unlike private investments, the feasibility of public investments should be evaluated not on net private revenue but on the basis of net gains to society as a whole Thus, in evaluating the costs and benefits associated with the project, one should take into consideration not only the direct costs and benefits that accrue to the project, but any external benefits associated with the project. The identification and measurement of cost and benefits pose a number of difficulties, in particular, the estimation of indirect costs and benefits.

15. Ideally, the benefits arising to society as a whole from a public project should be evaluated in relation to its impact on the social welfare function of the community. However, since the quantitative estimation of such a broad social welfare concept is difficult, the net benefit to society in these studies is usually cast in much simpler form; often as the impact on *per capita* income or *per capita* consumption. Such simplification of social welfare, of course, ignores a number of important aspects, such as distribution; moreover, there could very well be other national policy objectives, maintaining full employment, for example, which may conflict with a policy of increasing *per capita* income.[7] These benefits and costs, in whatever manner they are measured, arise through a series of time periods spread through the life cycle of the project. The comparison of these intertemporal streams of benefits and costs raises a number of methodological issues. The comparison of these series through time is usually carried out by associating weights to costs and benefits of different time periods; then, the weighted costs and benefits are aggregated and compared. The weights are needed before aggregation, because if such weights are not applied, it then would imply that society attaches equal weights to benefits arising, for example, in the near future, as well as, say, the period 20 years hence Although economists are generally agreed that a lower weight should be attached to costs and benefits expected in the future (say, 20 years hence compared with the present), not all of them are agreed upon the basis on which these weights should be determined[8] These, in short, are the major aspects of cost/benefit studies as applied to general public investment projects The application of these methods to demographic projects, in addition, raises a number of deeper philosophical issues relating to birth and non-birth decisions which are not discussed here[9]

16 In a series of articles, Enke, Ohlin and Zaidan, among others, have adopted the cost/benefit methodology to evaluate the net benefits that accrue to society from the prevention of a marginal birth[10] The net benefits to society are defined, in these articles, as the impact of preventing a marginal birth on the process of economic and social development of the country This definition, although sufficiently broad to incorporate most direct and indirect consequences of preventing such a birth, presents difficulties in translating the definition into quantitative measurable variables Because of these difficulties, the net benefits that accrue to society are interpreted as the impact of preventing a marginal birth on the *per capita* income[11] The mechanics of the estimation of the impact on *per capita* income in the above-mentioned papers is to estimate the income and consumption stream of an individual throughout his lifetime The difference between these two streams—his lifetime savings—when discussed and aggregated is interpreted as the current value of the net benefits There is, of course, no direct macro-economic connexion between this lifetime savings and the future *per capita* income of the community Although, in a micro-economic sense—at the family unit level—it could be argued that the net additional resources available to the family by the prevention of a birth would result in an increase in the consumption by the rest of the family, in a macro-

[7] For a detailed discussion of alternative goals of social policy and the estimates of benefits, see Portha Dasgupta and Stephen Margolin, *Guidelines for Project Evaluation* (United Nations publication, Sales No E.72 II B 11), pp 27-35

[8] For a further treatment of intertemporal choice and the determination of social rate of discount, see *ibid.*, pp 154 172

[9] For a discussion of the use of cost/benefit analysis in life and death decision, see E J Mishan, *Cost-benefit Analysis* (New York, Praeger, 1971), pp 153-163 See also Herbert E. Klarman, *The Economics of Health* (New York, Columbia University Press, 1965), pp 162-173 For a detailed discussion of the use of the cost/benefit method in project evaluation, see P. Dasgupta and S Margolin, *op cit*, chaps. 4, 8

[10] Steven Enke, "The gains to India from population control some money measures and incentive schemes", *Review of Economics and Statistics*, vol 42, No 3 (1960), pp 175 180, Goran Ohlin, "Population pressure and alternative investments", paper delivered at the general meeting of the International Union for the Scientific Study of Population, London, September 1969, George Zaidan, "The cost and benefits of family planning programs", *World Bank Staff Occasional Papers*, No 12 (Washington, D C., 1971)

[11] G Zaidan, *loc cit*, "The implicit objective of this approach is to maximize per capita income", p 2, S . "The gains to India ...", *loc. cit.* fun ob to raise per capita consumption".

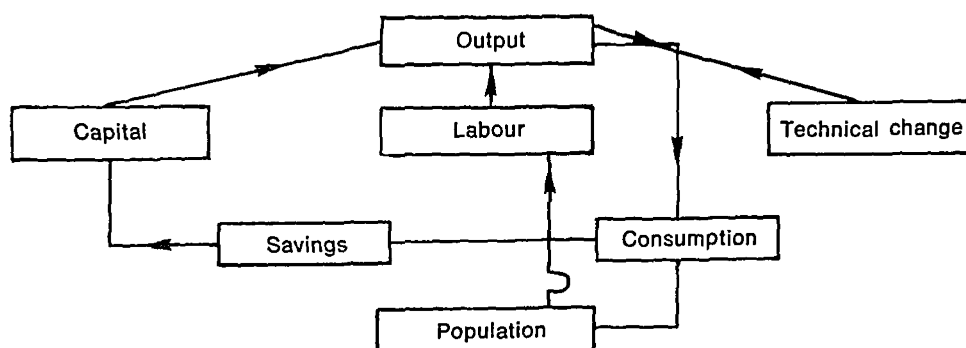
economic sense the connexion is more complex because of interlinking macro-economic relationships which are satisfied at the economy-wide level. If the aim is to evaluate the impact of the lifetime savings of a marginal birth on the consumption of the rest of the community it is necessary to include the other additional interconnecting relationships. In addition to these conceptual difficulties, the empirical results obtained from this method lead to some apparently paradoxical conclusions. The empirical results show that the net benefit of preventing a birth is at least 2.5 times the *per capita* income of the country—for all countries at all times. [12] These empirical conclusions perhaps are to be expected, as the income stream begins when the individual is 15 years old, while his consumption stream begins at birth; so that the current value of his income, under any normal rate of discount, would be very small compared with his current consumption.

[12] For a much fuller discussion of the empirical aspects, see Goran Ohlin, *Population Control and Economic Development* (Paris, Organisation for Economic Co-operation and Development, 1967), pp. 112-116.

17. The second approach for the evaluation of the economic impact of demographic change, as noted earlier, has developed around economic growth models. The objective of this method, like the earlier method, is to estimate the impact of a fertility decline on the future *per capita* income of the country. The evaluation is made by a comparison resulting from a decline in fertility with the *per capita* income for a specified future date, and the expected future *per capita* income with no decline in fertility. This approach, unlike the other, does not discount the future income stream, and thus avoids one difficulty. The principal aspect of this methodology is to introduce endogenously, into a macro-economic model, demographic variables. Before discussing the specific demographic studies using this approach, the macro-economic framework of the model and the manner in which demographic variables have been introduced into it are briefly outlined.

18. The macro-economic framework of these models and the manner in which demographic variables are introduced into them can best be illustrated using the following simple flow-diagram.

Manner of introducing demographic variables into macro-economic framework



The total output of goods and services is determined by three factors of production capital (K), labour (N) and technical progress (T):

$$Y = F\ (T, K, N)$$

Different models have assumed different forms of this function: from a simple capital output ratio relating output changes only with capital, to Cobb-Douglas production functions with autonomous technical progress. The supply of capital arises through domestic savings, which obtained from consumption and income—savings is that part of income which is not consumed. Population and its components influence total output in these models in two ways, through capital and labour. The influence of population on capital occurs through the consumption function:

$$C = aY + bP^*$$

The consumption function in these models is defined as a function (usually linear) of income and P^* the "equivalent consumer population". Savings is, therefore:

$$S = Y - C$$

and increment to capital formation:

$$\Delta K = I = S.$$

Not all the models incorporate labour as an explicit determinant of output, but those which do associate the supply of labour to the age-sex specific labour-force participation ratio in the form:

$$L = \sum_i \left[p_{mi}\, P_{mi} + p_{fi}\, P_{fi}\right]$$

where p_{mi}, p_{fi} are the male and female labour force participation ratio of the ith cohorts P_{mi} and P_{fi} respectively. If labour is introduced as an explicit variable, it is also necessary to introduce an equation defining the rate of unemployment, because an assumption of full employment could be misleading in connexion with developing countries. The extent to which labour is an effective factor in developing countries with large surplus labour is important. It is often argued that in

developing countries labour would always be forthcoming, given the supply of capital; and, as such, it need not be incorporated into the production function.

19. One of the earliest models to use this macro-economic framework is the now classical model of Coale and Hoover.[13] The model is estimated for India. These estimates, however, are based in large part on data for a single period. The benefits, as is customary, are measured by net changes in *per capita* income and the broader aspects of development, such as distributional aspects, are not taken into consideration in the analysis. As stated earlier, the principal element of the [illegible] decline in fertility is assumed to be given exogenously. The single factor of production is capital, and this factor is determined through domestic savings, and savings, as that part of income which is not consumed, is derived as a residue from the consumption function. Into this macro-economic framework, demographic variables are introduced in a number of ways. The consumption function incorporates population in two ways. First, the distributional aspects are introduced through the concept of "equivalent consumer units"—a weighted function of the total consuming population. Population enters this function again since *per capita* consumption is defined as a function of *per capita* income. The production relationships are somewhat modified. The capital output ratio, instead of being fixed, is assumed to shift by 0.02 every year; they also define a modified concept of investment called "equivalent growth outlays", which incorporates, in addition to investment in capital goods, investment in welfare services, which is assumed to increase the efficiency of the labour force. The welfare expenditure is introduced in two ways: first, the expenditure of the immediate past period is weighted by the labour force; secondly, the welfare expenditure 15 years previously is weighted by the dependent population of that period.

20. A number of other studies have adopted this general methodology. One such important study was made by Demeny.[14] As stated above, although the objective of Cole and Hoover was the impact of fertility decline, they did not incorporate fertility endogeneously into the model, they implicitly assumed that a fertility decline was feasible and incorporated such a decline into the analysis. Demeny, on the other hand, incorporated the decline in fertility into the model. He argues that the reduction of fertility requires demographic investments, and the resources required for these investments, if used for alternative investments, would result in a faster rate of growth of output. Using a model very similar to the Coale and Hoover model and two trends for fertility, one where gross reproduction rate declines from 3.0 to 1.5 over 25 years and the other where fertility remains unchanged, he estimates the difference in the necessary capital resources of the two on the assumption that the *per capita* incomes would follow the same paths. These savings in capital resources, he argues, are the maximum that would be available, if such a reduction is to result in a net benefit.

21. Enke,[15] also, has recently developed a model on lines very similar to the above models. His model also postulates two population trends, following the same patterns concerning a decline in fertility. The main difference in this model from that of Coale and Hoover is the production function. In addition to capital, labour and a constant rate of technological change are introduced into this function. The labour input is specified in two ways: first, the economically active labour force is determined by using constant age-sex specific participation rates, secondly, the rate of growth of employment is assumed to be proportional to the rate of growth of capital. This proportionality itself is assumed to be related to the unemployment rate.[16]

Fertility models

22. The economic-demographic models relating to policy discussed so far have concentrated on the economic consequences of demographic change. These studies have assumed that demographic changes are determined by factors outside their models and have not, therefore, attempted to explain them. However, it is widely recognized that important questions relating to economic and social processes influencing demographic behaviour still remain unanswered. For example, economic and social factors responsible for the decline in birth rates during the demographic transition, and the reasons for the ready acceptance of family planning in recent years, are yet to be determined.[17] A few brief comments on attempts at building theoretical and empirical models at explaining these relationships follow. An important characteristic of these models is that they are micro-economic demographic models; they intend to explain fertility behaviour at the family unit level, rather than at the aggregate economy-wide level.

23. Both Mincer and Easterlin developed early empirical models in this area.[18] Mincer tested

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[illegible]

[15] Steven Enke, "Economic consequences of rapid population growth", *Economic Journal*, vol. 81 (December 1971), pp. 800-811. W. E. McFarland and others, *Description of the* [illegible] (Santa Barbara, Calif., General [illegible]

[illegible], capital stock and [illegible]

$$\frac{\Delta N_t}{N_t} + \frac{\Delta K_t}{K_t} = h\frac{U_t}{U_t}$$

[illegible]

empirically, for determinants of fertility at the micro-level, a relationship in the form

$$X_o = b_1X_1 + b_2X_2 + b_3X_3$$

where X_o is fertility, X_1 the sum of husband's and wife's earnings, X_2 wife's opportunity costs, X_3 the number of years of husband's schooling (used as a measure of his knowledge of contraceptive information). For a sample of 400 employed, urban white families in the United States of America, he found the income-effect on fertility to be positive, the wife's opportunity costs, as well as the education effect, to be negative, which were consistent with theoretical expectations.

24. The theoretical models of fertility behaviour have evolved around the economic models of consumer behaviour. These start with the postulate that households maximize some utility function, where children, with other consumer goods, are assumed to appear as arguments. An important assumption on which these models are based is that the size of the family is a result of a conscious decision by the parents. It can be argued that this assumption may not be completely satisfied in developing countries, where the proportion of non-planned children may be relatively high. An early attempt at the development of a theory of fertility was made by Leibenstein. He identifies three types of utilities generated by children: (1) utility as a consumer good, personal satisfaction and psychic pleasure of parents; (2) utility as a productive agent, the child's contribution to the family income after he enters the labour force; and (3) utility as a potential source of security, either in the old age of parents or otherwise. Although these classifications of utilities are useful for the analysis of fertility behaviour in developing countries, it is generally recognized that a theory relating to the behaviour in developing countries must also incorporate other factors. Because of this, recent theoretical developments by Becker and Lancaster have incorporated cost and allocation of time and human capital into the economic theory of consumer behaviour. [19] In a recent paper, Schultz suggests the following four areas of recent contributions to economic analysis need to be incorporated into a modern theory of fertility behaviour: (1) investment in human capital; (2) the theory which treats a heretofore neglected basic attribute in the allocation of human time; (3) the household production function; and (4) a view of the family that encompasses both consumer choice and household production decisions, including the bearing and rearing of children. [20]

Economics: Studies in Mathematical Economics and Econometrics (Stanford, Calif., Stanford University Press, 1963); Richard Easterlin, "On the relation of economic factors to recent and projected fertility changes", *Demography*, vol. 3 (1966), pp. 131-153.

[19] Gary Becker, "A theory of the allocation of time", *Economic Journal*, vol. LXXV (September 1965), pp. 493-517; and Kevin J. Lancaster, "A new approach to consumer theory", *Journal of Political Economy*, vol. LXXIV (April 1966), pp. 132-157.

[20] Theodore Schultz, *loc. cit.*, p. s5.

25. Attempts have also been made to test empirically some of these recent theories. An interesting recent paper by Yoram Ben-Porath, using cross-section data of Israel, tests the cost of time and education hypothesis. [21] He finds that the hypothesis is consistent with only part of the evidence, leaving some other aspects of fertility behaviour unexplained. These new developments indicate the direction of future research, and the prospects seem to be good that real contributions would be soon made in this area.

Conclusions

26. This section is devoted to a few concluding comments on the relevance of these models to the analysis of economic and demographic trends in contemporary developing countries. As stated above, the developing countries are characterized by what has been called the "first phase of demographic modernization"—declining mortality with continuing high fertility rates. This process of modernization, however, has not proceeded at the same rate in all developing countries. In a few of the developing countries, it has set in, while in a few at the other extreme, the declines in mortality have reached low asymptotic levels, comparable to those of the developed countries; the majority of the developing countries are between these two extreme situations. Because of these differences, it is useful for the discussion of the interlinking relationships to separate the developing countries into the following three typological groupings: (1) countries where mortality rates are high; (2) countries where the mortality rates are declining, but have not reached their low asymptotic levels; (3) countries where mortality rates have reached low asymptotic levels. It is assumed that the countries in all three groups have high fertility rates.

27. The countries in the first group, where the early phase of demographic modernization has not yet set in, are also, in a much broader economic and social sense, the least developed among the developing countries. They are characterized not only by pre-modern demographic indicators, but by other pre-modern socio-economic characteristics. Under such conditions, it may be argued that the economic and demographic relationships closest to explaining their behaviour are the classical models postulated by Malthus and the classical economists. The other models (particularly the growth models) explaining economic behaviour have very little relevance in these countries. The pre-modern state of technology prevalent in these countries makes land the most important factor of production; furthermore, because of the lack of technical progress, the classical assumption of diminishing returns to land may be satisfied. In the analysis of demographic behaviour of these countries, the existing models also appear to be of little relevance. Recent studies have shown that there is little relationship between the decline in mor-

[21] Yoram Ben-Porath, "Economic analysis of fertility in Israel: point and counterpoint", *Journal of Political Economy*, vol. 81, No. 2, part II (March-April 1973), pp. s202-s233.

tality and the levels of *per capita* income, however, it seems a reasonable enough hypothesis that, although there is no noticeable relation with *per capita* income, there are relationships with such indexes of modernization as levels of literacy, basic infrastructure and other socio-economic indicators. More research in this direction is needed, such research could not only help promote better understanding of patterns of demographic change, but could help policy-makers formulate policies that could accelerate the initial phase of demographic modernization

28 Most of the developing countries belong to the second category, where mortality rates are declining, but have not reached low asymptotic levels The economic and non-economic factors causing demographic trends have yet to be explained; however, demographers are inclined to believe that these trends have been influenced, by both factors internal to these countries and by factors originating outside them An important external factor has been the technological advances in the prevention and control of the major causes of death, these methods, moreover, are available at relatively low costs Among the internal factors, perhaps one of the most important is the high priority given by national Governments to the introduction of modern methods of health control. It is, perhaps, because of the importance of these factors that there is little observed relation between this decline in mortality rates and *per capita* income. It may be recalled that in the developed countries, during a similar phase of their demographic history, there was a high correlation between these variables. In relation to the influence of these demographic changes in economic behaviour, the models developed by Newman and by Barlow to analyse the economic impact of demographic change, comes closest.[22] The macro-economic framework of these models are very similar to models of Coale and Hoover and others previously discussed.

29. In the third group of countries, since mortality rates have declined to low levels, further declines in mortality rates would be small. Future changes in population patterns in this group could arise, therefore, mainly from changes in fertility rates The relevant models for this group of countries, therefore, are the models explaining fertility behaviour; and, conversely, models explaining the economic impact of fertility change. The recent literature, as mentioned above, has emphasized models relating to both these aspects. Recent developments in micro-models relating to fertility behaviour have associated the demand for children in a manner similar to the treatment of "durable consumer goods" in the theory of consumer behaviour; in addition, recent theory has incorporated such concepts as cost-of-time of parents into the models Although these new developments are important contributions to the theory of fertility behaviour of developed countries, it is not clear how useful they are in explaining the behaviour in developing countries. It may, perhaps, be argued that a better basis for the formulation of a theory of fertility behaviour in developing countries may be formed by three types of utilities identified by Leibenstein (1) as a form of psychic satisfaction, (2) as a form of old-age insurance; (3) as a form of additional family income.

30 The macro-economic models developed by Coale and Hoover, Enke and others, which explain the impact of population change on economic growth, were previously discussed The question to be asked is how successful these models have been in explaining the impact of population change on economic growth This question is best discussed in two parts, first, the success of the models in identifying the main sources of growth, and, second, the success of the models in relating the changes in population to these main sources of growth The first question is related to growth models of developing countries Conventional theory of growth identifies four main sources of growth land, labour, capital and technical progress Of these, land, although considered important in classical analysis, is not considered sufficiently important in modern economic theory Of the remaining three, the growth models of developing countries concentrate only on capital The role of the other two, labour and technical progress, have not so far been adequately explained, specially in models relating to developing countries Of the two, the inability to explain technical progress is, perhaps, the greater weakness. For, in the case of labour, it can be argued that it is not a constraining factor of production in the contemporary developing countries and would, therefore, be forthcoming given the supply of the other constraining factors Technical progress, however, has been emphasized by a number of researchers as an important source of growth in contemporary developing countries If technical progress is an important source of growth, then the concentration on capital only would leave an important part of growth process unexplained, regardless of whether population changes have an impact on the rate of technical progress. In addition to these conventional sources of growth, recent researchers have also emphasized the important role of such non-conventional sources of growth as education and health[23] Thus, it appears that there are important missing links in most of the economic-demographic models, both in their attempts to explain the impact of demographic change on economic growth and in the influence of economic variables on demographic behaviour.

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[22] See Peter Newman, *Malaria Eradication and Population* [illegible]

[23] See Harvey Leibenstein, "The impact of population growth on economic welfare—nontraditional elements", in National Academy of S[illegible] *[illegible] Growth Consequences and Policy I[illegible]* (B[illegible] [illegible]d., Johns Hopkins Press, 1971), pp.

POPULATION, FOOD SUPPLY AND AGRICULTURAL DEVELOPMENT *

Food and Agriculture Organization of the United Nations

1. The relations between population and agricultural development are complex. Even the relation between population growth and food supply, on which attention is usually concentrated, has several distinct aspects. It is necessary to distinguish the longer from the shorter run, the potential from the actual achievement, and the global situation from that of individual countries and population groups.

2. In the long run, the potential exists for the adequate nutrition of a population far larger than the current one. In the shorter run, however, there have been and are likely to continue to be considerable difficulties in adequately feeding a rapidly growing population. Although at the world level food production has kept ahead of population growth, in a number of developing countries it has fallen behind. In many more of these countries, production has risen less than domestic demand and food imports have had to be greatly increased in order to keep up with demand.

3. In addition to providing for future population growth, there is a substantial backlog to make up as well. Again, although at the global level, current food supplies would be sufficient for the satisfactory nutrition of the entire population they are very unevenly distributed between regions and countries, between socio-economic groups, and even within families. Thus a large part of the current population, especially young children in developing countries, is inadequately fed in terms of nutritional requirements.

4. There is growing recognition that nutritional problems cannot be solved by increased production alone and that they are principally a reflection of poverty. The lack of sufficient opportunities for productive employment for the rapidly growing labour force in the developing countries is, in turn, one of the main causes of poverty. However fast non-agricultural employment can be expanded, the agricultural labour force of these countries is bound to go on increasing in absolute numbers for many years to come. This is particularly serious in view of the prevailing levels of underemployment in agriculture.

5. Rapid population growth therefore poses complex problems for the agricultural sectors of the developing countries. On the one hand, food production must be increased much faster than in the past. On the other hand, the production increase must be obtained in such a way as to generate as much employment as possible. At the same time as divising agricultural and rural development policies that will better meet these dual and not always wholly compatible aims, it is increasingly necessary to consider the effects of these policies themselves (and particularly those concerned with rural institutions and structures) on attitudes to family size.

6. Although this paper is concerned with world food supplies and world agricultural development, the emphasis is primarily on the problems of the developing countries. This is because there is no viable alternative to these countries becoming much more self-reliant in producing their own food supplies. Although the increase in world food demand, at least in the medium term, could perhaps more easily be met by increased production in the developed countries, this would involve insurmountable payments problems for the developing countries. Moreover, it is essential for these countries to increase their own food production as fast as possible, in order to provide employment for their rapidly increasing labour forces.

7. The issues summarized above are discussed more fully in the remainder of this paper. Many of them, which can be treated only briefly in a short background paper, are analysed in more detail in a study by the Food and Agriculture Organization of the United Nations (FAO), on the "State of Food and Agriculture 1974", to be published.

PAST TRENDS IN FOOD SUPPLIES IN RELATION TO POPULATION GROWTH

8. Although the longer term annual average increase in world food production has been greater than the growth of population ever since the Second World War, the margin was smaller in the 1960s than in the 1950s (see table 1). The increase in food production slowed down in the 1960s in every major region except Africa and North America. In part this reflects the large element of post-war recovery in the early 1950s. In the developed countries, population growth declined and the slower increase in production in the 1960s was partially due to deliberate government policies. In the developing countries, in contrast, it occurred in spite of accelerated population growth and government policies designed, in general, to increase production faster.

* The original text of this paper (E/CONF.60/BP/5) was submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

9. It is a tremendous achievement that for so long a period food production in the developing countries as a whole has kept ahead of a rate of population growth that is unprecedented in world history. In many countries, however, developments have been much less favourable. Table 6 (see annex) indicates that the increase in food production in 1952-1972 failed to keep up with population growth in 34 of the developing countries for which the relevant data are available, or about almost 40 per cent of the total

10. Population growth is estimated to account for about 70 per cent of the medium-term increase in the total demand for food in the developing countries Even in many developed countries, it is the major factor, since so little of the increase in income in these countries is spent on food. In the developing countries, if allowance is made for the effect of rising incomes as well as population growth, it appears that in 1952-1972, food production increased less than domestic demand in as many as 54 of the 85 countries for which the relevant data are available, or almost two thirds of the total.

11. It appears from the data in table 6 that a failure to increase food production in line with population growth and domestic demand is associated neither with particularly high nor with particularly low rates of population growth Of 26 developing countries with population growth of 3 0 per cent or more per annum,

TABLE 1. RATE OF GROWTH OF FOOD PRODUCTION[a] IN RELATION TO POPULATION, WORLD AND MAIN REGIONS, 1952-1962 AND 1962-1972

(Percentage per annum)[b]

	1952-1962			1962 1972		
	Population	Food production		Population	Food production	
		Total	Per capita		Total	Per capita
Developed market economies[c]	1 2	2.5	1 3	1 0	2 4	1.4
Western Europe	0 8	2.9	2 1	0 8	2.2	1 4
North America	1 8	1 9	0 1	1.2	2.4	1.2
Oceania	2 2	3 1	0 9	2 0	2 7	0 7
Eastern Europe and USSR	1.5	4.5	3 0	1 0	3.5	2.5
Total developed countries	1.3	3 1	1.8	1 0	2 7	1.7
Developing market economies[c]	2 4	3 1	0 7	2.5	2 7	0.2
Africa	2.2	2.2	—	2.5	2 7	0.2
Far East	2 3	3 1	0.8	2.5	2 7	0.2
Latin America	2 8	3.2	0 4	2.9	3 1	0.2
Near East	2 6	3 4	0 8	2 8	3 0	0 2
Asian centrally planned economies	1.8	3 2	1 4	1.9	2 6	0 7
Total developing countries	2 4	3.1	0.7	2 4	2 7	0 3
World	2 0	3 1	1.1	1.9	2 7	0 8

[a] Crop and livestock component of food production only (i e., excluding fish production)
[b] Exponential trend.
[c] Including countries in other regions not specified.

production lagged behind in 10, equalled or exceeded population growth but failed to match domestic demand in 7, and equalled or exceeded demand in 8. It appears likely that the crucial factor has not been the rate of population growth itself but the response of Governments and, with their help, of farmers to this rate. A wide range of government measures, particularly for the provision of infrastructure, services and incentives for farmers, are needed if the increase in demand occasioned by rapid population growth is to be reflected at the farm level in a sufficient expansion of food production. It is clear that many developing countries have not been able to meet this challenge.

12 The trends in food production discussed above include only crop and livestock production and do not cover fish production. The latter, however, contributes only 1 per cent of world food supplies in terms of dietary energy, 5 per cent of total protein and 14 per cent of animal protein, although it is of much greater importance in some countries. Thus, the rapid increase in fish production (about 6 per cent per annum in the 1950s and 1960s, although it has since tailed off) would make little difference to the overall trend of food production except in a few countries.

13. The longer term increase in food production has been accompanied by substantial year-to-year fluctuations, caused mainly by the weather. As a result, in a number of individual years, the increase in [illegible] production has been less than population growth [illegible] at the world level Because [illegible] food production in the [illegible] population growth in 196[illegible]

in 1967-1970 by an encouraging spurt in production, not only because of better weather but because of the beginning of the rapid introduction of the high-yielding varieties of cereals and the associated "green revolution" technology, especially in the major food deficit countries of the Far East. But in 1971 and 1972, there was again widespread bad weather in the developing countries; and in the latter year, it coincided with bad weather in many developed countries as well, especially in the Union of Soviet Socialist Republics. It is therefore estimated that in 1972, probably for the first time in the whole period since the Second World War, world food production declined slightly in absolute terms and not just in relation to population growth. *Per capita* food production in the developing countries fell by 3 per cent to somewhat below the 1961-1965 average level.

14. The effects of the fall in world food production in 1972 are well known and still persist in 1974. They have led to the calling of a United Nations Food Conference in November 1974. Stocks have been dangerously depleted, food prices have risen astronomically and a number of developing countries have suffered severe food shortages. These difficulties in the food and agricultural sector itself have coincided with and are also linked with disquieting developments in the wider economy, including inflation, monetary problems, the energy crisis, fears of world-wide recession and a general atmosphere of uncertainty. In spite of generally favourable weather and large harvests in 1973, world food supplies in 1974 still depend precariously, because of the low level of stocks, upon the outcome of the current year's harvests and thus to a great extent upon the weather.

15. The longer term lag of food production behind the growth of domestic demand in so many developing countries has greatly increased their dependence on food imports, particularly of cereals, which are the staple element of the diet of most of them. Between 1949-1951 and 1966-1968, their gross imports of cereals rose from 12.4 million to 34.4 million tons, and by 1972 they reached 36.0 million tons.[1] Their value rose from about $1 thousand million in 1955 to some $3 thousand million in 1967. In 1971-1972, the value was about the same as in 1967; but with the recent increases in prices, it rose to about $4 thousand million in 1972-1973 and is tentatively estimated as between $9 thousand million and $10 thousand million in 1973-1974. The difficulty of meeting such inflated food import bills has been greatly enhanced by the current much higher prices for petroleum, fertilizers and many other products which most of the developing countries have to import. Moreover, just when it is most needed, food aid has shrunk not only in value, but even more in terms of quantity as a result of the higher prices.

[1] Excluding China, for which figures are not available.

16. Before the Second World War, the developing countries as a whole were net exporters of cereals, but they have subsequently become substantial net importers, as a result of the failure of so many of them to increase their own production in line with population growth and demand. Notwithstanding the rapid increase in the imports of the developing countries, however, the developed countries still account for about two thirds of the total gross imports of cereals. In the developing countries, *per capita* consumption of cereals in 1970 averaged about 190 kg, almost all of which was consumed directly. In such countries as Canada and the United States of America, total annual cereal consumption is around 1 ton *per capita*, of which only about 70 kg are consumed directly, most of the rest being used for livestock feeding. The developed countries as a whole, with about 30 per cent of the world population, were responsible for 54 per cent of the total consumption of cereals for all uses in 1970. In these countries, 370 million tons of grain were used annually for livestock feed in 1969-1971.

Food consumption and nutritional requirements

17. It is now considered that nutritional problems mainly concern the total availability of dietary energy, rather than the protein content of the diet.[2] If the energy intake falls below requirements, the utilization of protein is impaired, since it has to be used as a source of energy.

18. At the world level, the dietary energy supply is estimated, on the basis of FAO food balance-sheets, as 5 per cent above requirements in 1970 (table 2). However, the developed regions had more than 20 per cent above requirements; while the developing regions, in spite of some improvements during the 1960s, had an over-all deficit of about 3 per cent of dietary energy requirements in 1970. Latin America had a surplus of dietary energy of about 5 per cent in 1970; but in Africa, the Far East and the Near East there were deficits of from 6 to 8 per cent. Average protein intakes in the developing regions were only about 60 per cent of those in the developed regions, and much of these smaller intakes was being diverted from its true use to meet energy deficits.

19. Full food balance-sheet information is not available for the most recent years. All the evidence suggests, however, that with poor harvests so widespread and with the shortage and high price of cereals on world markets, *per capita* supplies as well as production of food declined in the developing regions in 1972.

20. Differences between countries are even greater than those between the regional averages shown in

[2] Food and Agriculture Organization of the United Nations/World Health Organization, *Energy and Protein Requirements: Report of a Joint FAO/WHO ad hoc Expert Committee, Rome, 22 March-2 April 1971*, FAO Nutrition Meetings report series No. 52, WHO technical report series No. 522 (Rome, 1973).

TABLE 2. AVERAGE DAILY FOOD SUPPLIES[a] *per capita*, WORLD AND MAIN REGIONS, 1961 AND 1970

	Population[b]		Dietary energy				Protein	
	1961	1970	1961	1970	1961	1970	1961	1970
	(millions)		(kilocalories per capita)		(percentage of requirements)		(grams per capita)	
Developed market economies[c]	658	725	2,950	3,050	116	120	87.5	91.2
Western Europe	329	356	3,020	3,100	118	122	89 3	92 0
North America	202	227	3,110	3,260	118	123	92.3	97.3
Oceania	13	15	3,210	3,100	121	226	92 7	101 4
Eastern Europe and USSR	317	349	2,990	3,250	116	126	85.5	98.5
Total developed countries	975	1,074	2,960	3,110	116	122	87 0	93 6
Developing market economies[c]	1,376	1,751	2,130	2,180	93	95	55 1	55 4
Africa	220	273	2,120	2,160	92	92	55 7	56 3
Far East	802	1,020	2,050	2,080	92	94	51.3	51 1
Latin America	219	283	2,410	2,510	100	105	63 7	65 0
Near East	134	171	2,200	2,280	89	93	62.3	63 7
Asian centrally planned economies	686	810	2,020	2,360	86	100	54 7	63 0
Total developing countries	2,062	2,561	2,100	2,240	91	97	54 9	57.7
World	3,037	3,635	2,380	2,500	100	105	65.2	68 4

[a] Food available at the retail level after allowance for waste

[b] The population data are based on the earlier United Nations estimates, since it has not yet been possible to revise the FAO food balance sheets on the basis of the latest estimates, which, however differ only slightly

[c] Including countries in other regions not specified

table 2. Table 6 (see annex) indicates that 62 developing countries still had over-all dietary energy deficits in 1970. In 25 of these countries, 12 of them in the African region, the deficit was more than 10 per cent Similarly, the national averages shown in the table in the annex mask big differences between socio-economic groups within the countries

21. Within the poorer families, it is the young children (and also to some extent the pregnant and lactating women) who bear the main brunt of an insufficient food supply, since the working adults tend to take the largest share for themselves in order to maintain a minimum level of activity. Moreover, young *children are often unable to digest sufficient of the* predominantly bulky starchy staple foods to be adequately nourished. Household surveys indicate that children's food intakes are not proportional to the total supplies available in the household, and that poor children receive only about half of the dietary energy and protein consumed by those in better-off families

22. On the basis of clinical and anthropometric data, it may be approximately estimated that 10 million of the children under five years of age in the developing countries are suffering from severe malnutrition, 80 million from moderate malnutrition, and 120 million from less obvious, milder forms of malnutrition. In total, therefore, about half of all the children in the developing world may be inadequately nourished. In some Latin American countries, more than half of all the deaths of children under five years of age are directly or indirectly attributable to nutritional deficiencies.[3] Thus, a main consequence of nutritional improvement would be a reduction in mortality in this age group, and, other things being equal, an acceleration of population growth, at least in the short run, although experience has shown that such a reduction is a prerequisite of an eventual decline in fertility

23 On the basis of the limited available information on the distribution of food supplies among households in the different socio-economic groups, it is now estimated by FAO that at least 400 million people, or 14 per cent of the population (excluding the Asian planned economies), have food intakes insufficient to meet the maintenance cost of energy [4] This must be regarded as a lower limit, and the actual number of those suffering from protein-energy malnutrition could be very much higher. But even this lower limit indicates the awesome magnitude of the task of adequately feeding even the existing population

24. Apart from the protein-energy malnutrition discussed above, there are other specific nutritional deficiencies that affect large numbers of people Although beri-beri, pellagra and scurvy, for example, have become less important as public health problems, such serious conditions as vitamin A deficiency, nutritional anaemia and endemic goitre are still widely prevalent.

25. Ecological conditions, social habits, food taboos and infectious and parasitic diseases play an important

[3] Ruth Rice Puffer and Carlos V. Serrano, *Patterns of Mortality in Childhood Reports of the Inter-American Investigation of Mortality in Childhood*, World Health Organization, Pan American Health Organization, scientific publication No 262 (Washington, D C., 1973), p 164-166

[4] The maintenance cost of energy, set at 1.5 times the basal metabolic rate, is lower than the average requirement shown in table 2 and in table 6 The calculation given above takes account of the standard deviation of 0 15 in this rate

part in causing nutritional deficiencies. However, it is clear from household survey data that these deficiencies are mainly a function of poverty. Most of the poor people in the developing countries are in the rural areas. The most vulnerable among the rural population are the families of landless agricultural labourers, who have to live off meagre and uncertain incomes earned mainly during the planting and harvesting seasons. Almost as vulnerable are the far more numerous subsistence farmers, whose holdings are so small that they find it difficult to feed their families adequately even in years of good harvest. When the harvest is poor, and often in the season immediately prior to the harvest, their nutritional status becomes highly precarious. Such people are in a vicious circle of undernutrition and underemployment: undernutrition reduces their activity, particularly at such peak periods as the planting and harvesting seasons, thus reducing employment and incomes and tending to perpetuate undernutrition.

26. Nevertheless, the urban poor, and especially the recent migrants from rural areas, are probably those in the worst nutritional situation. Deprived of access to subsistence food production, many of them are without regular or adequate income to purchase sufficient food. The very rapid urbanization occurring in the developing countries is thus accentuating the unsatisfactory nutritional situation.

27. There are cases, as in part of Ethiopia and in the Sahelian zone at the current time, where unfavourable climatic conditions result in dramatic increases in malnutrition and outright famine. Large populations become impoverished, and the death rate among them reaches abnormally high levels. Although such situations rightly attract world-wide attention, they should not obscure the fact that most deaths from malnutrition result from a long-term deficiency of food that goes virtually unnoticed in conditions that pass for "normal".

Future demand for food

28. The latest in the series of FAO periodic projections of the future demand for food and other agricultural commodities [5] have been partially revised and extended to 1985 and 1990 for the forthcoming United Nations World Food Conference. As concerns population growth, the revised projections are based on the United Nations provisional "medium" assumption made in 1974 on the basis of recent national censuses, which indicates that in 1970-1990, world population would expand by 2.0 per cent per annum, that of the developed countries by 0.9 per cent per annum, and the developing countries by 2.4 per cent. Gross domestic product (GDP) is projected on the basis of recent trends, indicating a growth of 5.0 per cent per annum in the developed countries and 5.9 per cent in the developing countries. On a *per capita* basis, however, this relationship is reversed because of the faster growth of population in the developing countries, with GDP *per capita* growing at 4.1 per cent per annum in the developed countries and 3.5 per cent in the developing. Unchanged relative prices have had to be assumed, although some substitution effects, arising from shifts in consumer preferences, are introduced through the trend factor. Consumption functions have been fitted as in the earlier projections.

29. The projections are in no sense a forecast. However, they indicate that, on the assumptions made, the world demand for food would rise by 2.5 per cent per annum and by 65 per cent in total between 1970 and 1990 (table 3). The increase would range from 1.6 per cent per annum and 37 per cent in total in the developed countries to 3.5 per cent per annum and the staggering figure of 99 per cent in total in the developing countries. At the world level, relatively high rates of growth of demand for fish (3.4 per cent per annum) and meat (3.2 per cent) indicate a progressive shift in demand towards more varied protein-rich foods, in preference to cereals (2.2 per cent per annum) and starchy roots (1.4 per cent). In the developing market economies, with their faster population growth and greater demand responsiveness at lower levels of income, the demand for cereals would increase by 2.8 per cent per annum and that for the more preferred foods at correspondingly higher rates. The increase in the world demand for cereals for direct human consumption would amount to about 330 million tons, or 50 per cent. Total world demand for cereals to meet food, feed and non-food uses would rise by about 660 million tons, or 55 per cent, over the 20-year period. Assuming no substantial changes in production techniques and continued modest im-

TABLE 3. PROJECTIONS OF THE INCREASE IN DEMAND[a] FOR FOOD AND FOR CEREALS, 1970-1985 AND 1970-1990

(Percentage)

	Average annual increase[b]		*Total increase*	
	1970-1985	*1970-1990*	*1970-1985*	*1970-1990*
Total food	2.5	2.5	45	65
Developed countries	1.6	1.6	27	37
Developing countries	3.5	3.5	68	99
Cereals	2.2	2.2	39	55
Net food use	2.1	2.0	36	50
Developed countries	0.2	0.1	2	3
Developing countries	2.6	2.5	47	65
For livestock feeding	2.4	2.5	43	63
Developed countries	2.0	2.0	36	50
Developing countries	5.0	5.1	107	168

[a] Based on the United Nations provisional "medium" assumption for population growth made in 1974 and the extrapolation of recent trends in gross national product and private consumption expenditure.
[b] Compound interest.

[5] Food and Agriculture Organization of the United Nations, *Agricultural Commodity Projections: 1970-1980* (Rome, 1971).

provements in the efficiency of feed conversion, the demand for cereals for livestock feeding in the developed countries would increase from about 370 million tons in 1970 to 560 million tons in 1990, or by 50 per cent.

30. These figures would be altered by different assumptions as to the growth of income and especially of population However, in the short period of 20 years, the range between the alternative population assumptions is fairly narrow. Thus, it appears that the total increase in demand for food in the developing regions between 1970 and 1990 would be some 4 per cent greater on the United Nations medium population assumption (the basis of the projections discussed here) than on the low assumption, and some 7 per cent greater on the high than the low assumption.

31. On the income side, it is not only the rate of growth of GDP, but its distribution that is important. The redistribution of income in favour of the poorer classes would have a major effect on the demand for food, because of the higher income elasticity at low income levels A recent FAO study estimates that a moderate redistribution in eight South American countries (implying the channelling of almost all of the income increase to the poorer groups) would add about 7 per cent to the demand for dietary energy by 1980, while a more drastic redistribution (involving part of the income now going to the higher income groups) would add about 10 per cent. [6]

32. If available food supplies increased in line with the projected increases in effective demand discussed above, there would be some improvement in diets in the developing countries, but substantial nutritional deficiencies would remain in 1990. Dietary energy consumption would rise to 2,510 kilocalories *per capita* per day in these countries, or 9 per cent above over-all requirements, and protein consumption to 67 grams *per capita* per day in comparison with 99 grams in the developed countries. Nevertheless, cereals, starchy roots and sugar would in 1990 still constitute 72 per cent of the total dietary energy intake in developing countries, as against 77 per cent in 1970. In many Far Eastern countries and to a smaller extent in Africa, average *per capita* demand for dietary energy would remain below the level required for moderate activity until well into the 1980s. Although the number of countries in which the over-all demand for dietary energy is below nutritional requirements would diminish, in 1990, there would still be 26 such countries, with a combined population of 365 million Furthermore, these estimates take no account of the uneven distribution of the available food supplies between socio-economic groups, either in these countries themselves or in those where the over-all demand for dietary energy would meet nutritional requirements

33. It would be of considerable interest to project food demand up to the end of the century, since the size of the population by that time is already virtually determined between certain limits. The latest United Nations projections on low, medium and high assumptions indicate increases of 66, 77 and 88 per cent, respectively, in the world population between 1970 and 2000 For the developing countries, the corresponding figures are 85, 99 and 112 per cent. Demand projections for a quarter of a century ahead have not yet been attempted, since in such a long period many things, such as tastes and preferences and also the types of food available, that can be assumed relatively constant in shorter periods, must be expected to change However, simply extrapolating the income trends and using the income elasticities assumed in the projections for 1990, the world demand for food would increase between 1970 and 2000 by 93 per cent on the United Nations low population assumption, 104 per cent on the medium and 117 per cent on the high In the developing countries the increases would be 160, 175 and 192 per cent, respectively

Future food supplies

34 Thus, although the demand projections discussed above are very far from being forecasts of what will actually happen, it appears likely to be necessary (on the medium population assumption) to double world food supplies between 1970 and some time around 2000, in order to keep up with demand (of which the main component is population growth) In the developing countries, food supplies would need to be doubled in 20 years from 1970 The last doubling of food production appears to have taken some 25 years (from about 1948 to 1973) at the world level and about the same time in the developing countries

35. It is much more difficult to assess the future growth of food production than of demand There is a very wide range of possible changes in such factors as technology, farm structure, the quantity and quality of inputs and services available to farmers, price policies and international markets that would influence the outcome Simply to extrapolate past trends is itself instructive, however, since it illustrates approximately what would happen if there were no changes of this kind and also helps to indicate the changes that may be desirable.

36. Table 4 extrapolates to 1985 [7] the exponential trend in food production from 1961-1963 to 1973, and compares the results with expected population

[6] Food and Agriculture Organization of the United Nations, *Perspective Study of Agricultural Development for South America*, provisional version, PSWAD/01 (Rome, August 1972), vol I, p V-70-V-76 See also "The impact on demand of changes in income distribution a case study of eleven Latin American countries", *Monthly Bulletin of Agricultural Economics and Statistics*, vol 21, No 3 (March 1972), pp 1-11

[7] [illegible] *Plan for Agricultural Development* (Rome [illegible]

TABLE 4. EXTRAPOLATIONS OF FOOD PRODUCTION IN COMPARISON WITH POPULATION GROWTH AND WITH DEMAND PROJECTIONS, WORLD AND MAIN REGIONS, 1970-1985

(Percentage per annum)

	Production [a]	*Population* [b]	*Domestic demand*
Total developed countries	2.8	0.9	1.6
Developing market economies	2.6	2.7	3.7
Africa	2.5	2.9	3.9
Far East	2.4	2.6	3.5
Latin America	2.9	3.1	3.6
Near East	3.1	2.9	4.2
Asian centrally planned economies	2.6	1.6	3.1
Total developing countries	2.6	2.4	3.5
World	2.7	2.0	2.5

[a] Exponential trend, 1961-1963 to 1973.
[b] United Nations provisional medium assumption made in 1974.

growth and with the projections of demand at constant relative prices discussed above. At the world level, production would approximately match demand, but the position of the developed and developing countries would contrast very sharply. In the former, there would be a substantial excess of production over their own domestic demand, which would, of course, materialize only if called for by export demand. However, the disquieting result emerges that in the developing market economies, a continuation of the rates of production increase from 1961-1963 to 1973 would not even keep up with the population growth expected in 1970-1985. Only in the Middle East and in the Asian centrally planned economies would production increase faster than population. And in each of the developing regions, production would increase much more slowly than demand. In the developing countries as a whole, production would rise by 46 per cent, covering little more than two thirds of the projected expansion of 67 per cent in demand.

37. This theoretical imbalance between production and demand in the developing countries could be rectified by a faster increase in their food production, by higher prices (which would not only reduce demand, but increase production faster), or by a massive increase in their food imports. Higher prices and reduced demand would accentuate still further the nutritional deficiencies referred to earlier. Increased food imports on the scale required would scarcely seem feasible.

38. For cereals alone, the net import requirements of the net importing countries among the developing market economies would rise to between 80 million and 90 million tons by 1985 or about double their annual net imports in 1969-1972. There is little doubt that export supplies of this level could be produced in the developed countries. But they would cost between $6 thousand million and $8 thousand million even at 1969-1972 prices, and from $16 thousand million to $18 thousand million at 1973-1974 prices. It is hardly conceivable that, with current trade arrangements, many of the food deficit developing countries could export enough to the developed countries to meet such import bills, even if there were an immense increase in food aid to cover part of the needs.

39. It is clear, therefore, that if such an unmanageable situation is to be avoided, a substantial acceleration is essential in the expansion of food production in the developing countries themselves. The achievement of the average annual rate of increase of 3.7 per cent in agricultural production in the developing countries proposed for the period from 1961-1963 to 1985 in the FAO Provisional Indicative World Plan for Agricultural Development (IWP) would, in fact, roughly equal the projected increase in demand for food. The objectives proposed in the IWP for 64 countries were the main basis for the target of a 4 per cent average annual increase in agricultural production in the developing countries as a whole contained in the international strategy for the second United Nations Development Decade covering the 1970s. So far, there have been large shortfalls from these objectives and targets, and very high rates of increase would now be needed if they were still to be met on time.

40. The fact that so many countries have not yet achieved rates of growth compatible with the objectives proposed in the IWP[s] does not mean, however, that these objectives were unrealistic. The Governments of the countries concerned have indeed often criticized them as being too low, and they are seldom above the targets in national development plans. They were based on a careful, country-by-country analysis of technological, economic and social possibilities, and are related to proposals for policy changes, investment and input use. A critical re-examination of the analysis, undertaken in preparation for the World Food Conference, indicates that the objectives should still be attainable, although obviously now with some time lag, provided certain important conditions can be satisfied. These include the mobilization of adequate domestic savings and a higher priority to agriculture in using these and other resources, more rapid institutional changes, sufficient political stability to support orderly progress and greatly increased international assistance. If the increase in production in the developing countries could be accelerated in these ways,

[s] The proposed objectives concern total agricultural production, but trends in food production differ very little over the long periods considered here and at the regional level of aggregation. A recent analysis indicates that in the period from 1961-1963 to 1971, the objectives of the Indicative World Plan were met in only 21 of the 64 countries covered, or about a third of the total. See "Agricultural production in developing countries in relation to the targets of the Second United Nations Development Decade", *Monthly Bulletin of Agricultural Economics and Statistics*, vol. 22, No. 4 (April 1973), pp. 1-17.

their likely food import gap could probably be reduced to manageable proportions.

41. The production objectives proposed in the IWP are largely based on the much fuller use of existing agricultural technology. Increasingly, however, it will be necessary to broaden the technological base, in particular by the extension of the "green revolution" technology and the high-yielding varieties of cereals to other crops and to less favoured areas. A substantial international research effort has recently been launched for this purpose. Looking more than 15 years or so ahead is highly speculative; but it seems reasonable to suppose that such an enlarged technological base for conventional agricultural production could, if available in time and if put rapidly enough into use, suffice to meet the increases in population and demand that might be expected by the year 2000.

42. Beyond the end of the century, conventional agricultural production could probably still be expanded severalfold provided certain major technological breakthroughs could be achieved, such as the continuous cultivation of humid tropical soils after the tree cover is removed, and the desalination of sea water cheap enough to irrigate the warm deserts, and provided they could be achieved when needed and implemented fast enough, and that huge regional imbalances could be overcome by transfers either of food supplies or of population.

43 Estimates of the population that could eventually be adequately fed from conventional agricultural production range from about 50 thousand million to about 130 thousand million people. They are even larger if based on diets involving the processing of less cereals through livestock. Similarly, they are increased still further on the basis of unconventional foods using little land in their production

44. Such calculations are, however, a far cry from what is actually happening or is likely to happen, and should not lead to any complacency about food supplies and population growth In actual fact, many developing countries have, as indicated earlier, been unable to increase food supplies as fast as population growth and demand If they are to raise production at the rates called for in the IWP, enormous extra efforts will be needed of which there is as yet little sign Furthermore, even if this acceleration of production growth is attained, there will still be many millions of people whose diets are nutritionally inadequate.

Agricultural employment[9]

45. In addition to increasing the number of people to be fed, population growth, of course, also increases the labour force that can be used to produce the necessary food. In the circumstances of the developing countries today, however, the rapid increases that are occurring in their labour forces bring additional problems One of the main differences from the development period of the countries that are now industrialized concerns the supply of labour and the demand for it On the supply side, rapid population growth is causing the labour force to increase at unprecedented rates On the demand side, modern industry is absorbing less and less labour per unit of output. Thus, although in the long run the rapid development of non-agricultural jobs is the only solution to the employment problems of the developing countries, in most of these countries such jobs can currently be increased fast enough to absorb only a fraction of the increase in the agricultural labour force

46 The share of agriculture in the total labour force of the developing countries is declining, but it is estimated that it still averaged about two thirds of the total in 1970 and will not fall to half of it until around 1990 (table 5) In contrast with the developed countries, however, the agricultural labour force in almost all of the developing countries is still increasing in absolute numbers, and may be expected to continue to do so in most cases for many years to come FAO projections indicate a rise of about 166 million or 25 per cent between 1970 and the year 2000

47. The turning-point when the agricultural labour force finally begins to decline in absolute numbers (and the maximum size reached at that time) depends upon the rate of growth of the total labour force (and thus mainly on population growth), the initial share of agriculture in the labour force and the rate at which non-agricultural employment can be created On the assumptions made in table 5, it may be conjectured that in the developing countries as a whole this turning-point would not come until the year 2006, when their agricultural labour force would reach a maximum of 846 million, representing 39 per cent of the total. The date of the turning-point (and the share of agriculture in the labour force when it was reached) would, of course, vary substantially from region to region and even more from country to country. If population growth were at the United Nations low variant rate, the turning-point would be reached only a few years earlier but at a much lower level, the high variant would delay it by only a few years but would take the maximum agricultural labour force to a much higher level. A change in the rate of growth of non-agricultural employment substantially alters the time it takes to reach the turning-point.[10]

48. The increasing agricultural labour force has to share the limited market for agricultural products represented mainly by the small non-agricultural population and the export market. Underemployment and low levels of labour productivity are inevitable in such circumstances and are also accentuated by the highly

[9] [illegible]

[10] Food and Agriculture [illegible] of the Un[illegible] *The State of Food and* [illegible]

TABLE 5. AGRICULTURAL LABOUR FORCE, WORLD AND MAIN REGIONS, RECENT YEARS AND PROJECTIONS TO 2000[a]

	Agricultural labour force (millions)					Share of total labour force (percentage)				
	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
Developed market economies	56	43	31	22	16	20	14	9	6	4
Eastern Europe and USSR	68	57	44	30	19	43	32	22	14	8
Total developed countries	124	100	75	52	35	28	21	14	9	6
Developing market economies	376	421	470	522	573	71	65	58	50	42
Africa	74	84	95	106	110	80	76	69	60	48
Far East	236	265	296	332	374	74	68	61	53	47
Latin America	34	37	39	41	42	48	42	35	28	22
Near East	31	34	38	42	44	69	62	54	45	36
Asian centrally planned economies	238	250	258	265	264	76	67	59	52	44
Total developing countries	614	671	728	787	837	73	66	58	50	43
World	738	771	803	839	872	58	51	45	39	34

SOURCE: Estimates of the Food and Agriculture Organization of the United Nations (FAO), based on United Nations medium variant for total population, and estimates and projections of International Labour Organisation for total economically active population. United Nations population figures are those assessed in 1968, since it has not not yet been possible to revise the labour force data on the basis of the most recent figures. The FAO projections assume that in the developing countries, gross domestic product *per capita* will increase in line with the United Nations projections for the second Development Decade, and that the growth rate of agricultural gross domestic product in relation to total gross domestic product will be as assumed in the FAO Provisional Indicative World Plan for Agricultural Development.

[a] Population economically active in agriculture. Actual data are generally available up to some year between 1960 and 1965; the base period of the projections is 1965.

seasonal nature of so much agricultural work. Although the market for agricultural products is limited in this way, it is clear from the earlier discussion of production trends that many developing countries have failed to increase production up to this ceiling and have thus missed opportunities to expand agricultural employment. To the extent that they have had to import food products that they could produce themselves, employment and income-earning opportunities have in effect been transferred from their farmers to farmers in developed countries.

49. In large part because of rapid population growth, agriculture has a particularly crucial role to play in providing employment opportunities at the current stage of development. Its traditional employment role was seen as releasing labour, by means of increased productivity, for work in other sectors. Although agriculture still has this role, it is dwarfed for the time being by the need to provide additional employment opportunities at a rate that will slow down rural-urban migration to the pace at which urban jobs can be generated and people trained for them. Many of the 130 million or so people in the developing countries who migrated from rural to urban areas in the 1960s faced, at least temporarily, severe unemployment or underemployment. If past trends continue, the total number of such migrants in the 1970s might be of the order of 170 million.

50. Yet, in spite of such rapid rural-urban migration, most of the work force of the developing countries will still be in agriculture for a long time to come. Increased agricultural employment opportunities are therefore a basic element in the reduction of poverty and the improvement of income distribution that are the key to the alleviation of the unsatisfactory nutritional situation discussed earlier.

AGRICULTURAL AND RURAL DEVELOPMENT POLICIES

51. Rapid population growth has many implications for agricultural and rural development policies. Most of the policies involved are national policies, especially the national policies of the developing countries. Many measures are also required at the international level if food production is to be increased fast enough to keep up with population growth and demand and if progress is to be made in alleviating poverty and malnutrition. The necessary measures at both national and international levels are to be discussed at the forthcoming World Food Conference, which appropriately takes place shortly after the World Population Conference. Some of them will be briefly summarized here, particularly those most closely connected with population questions.

52. In view of the depletion of stocks, there is an urgent need for the establisment of some system of world food security, if large populations are not to be at risk every time the weather or other factors cause a crop failure. The food production capacity of the developed countries has a big role to play in the rebuilding of stocks to safe levels, since it is likely to be some time before the increase in food production in the developing countries can be sufficiently accelerated. Measures of international agricultural adjustment could also contribute substantially to a more orderly and rational world food economy. Such

measures could make provision for increasing the agricultural export earnings of the developing countries, thus making it easier for them to import food or the fertilizers and other requisites for its production, and providing increased agricultural employment opportunities The latter would be much greater than those that would be forgone in the developed countries, where in any case the agricultural labour force is already falling rapidly.[11] Increased international assistance is badly needed, including the expansion of food aid to at least its former level and measures to ensure adequate supplies of fertilizers for the developing countries International research must be constantly looking ahead to the next phase of technological development that may be required by continued population growth.

53. But most of the effort will have to be in the developing countries themselves and particularly in those where population growth is fastest. In the developing countries as a whole, the increase in food production needs to be about a third faster than in the recent past if their already burdensome food imports are not to rise sharply. This figure provides a rough indication of the increase in the commitment to and investment in agricultural development that is required.

54. Because of the increasing pressure of population on land resources, much more of the production increase than in the past will have to come from higher yields per hectare. Table 6 (see annex) indicates that the population density per hectare of agricultural land is already very high in many countries. Although many developing countries still have large areas of unused but potentially productive land, the remaining areas are often inaccessible and costly to develop. On the basis of the increases in agricultural land considered technically and economically feasible, it is estimated that the number of people per hectare of agricultural land would rise from 0.7 in 1961-1963 to 1.2 in 1985 in the developing countries covered in the IWP, and from 2.9 to 4.9 in the Far East.

55. In many countries, the necessary intensification of production and raising of yields depends heavily upon the costly development of irrigation and drainage. In all of them, a massive expansion is required in the use of modern inputs and in the credit to enable farmers to purchase them. The IWP production objectives are estimated to entail annual increases of 12 per cent in the use of fertilizers, 11 per cent for pesticides and 9 per cent for tractors in the developing countries as a whole. In addition to the foreign exchange and other difficulties involved in obtaining the necessary supplies, such rates of increase imply an enormous task for the usually inefficient and inadequately funded and staffed government services for credit, extension and training

[11] Proposals both for international agricultural adjustment and for a world food security system were presented by the [illegible] Organization of [illegible] on of the FAO [illegible] road lines were [illegible]

56. The very rapid urbanization of the populations of the developing countries has major implications for their agricultural policies Mainly because of urbanization, the IWP objectives involve an increase of 5 or 6 per cent per annum in marketed production, as compared with less than 4 per cent in total agricultural production Improved marketing has an important role to play in the provision of incentive prices to farmers, but substantial expansions and improvements are needed in the whole marketing chain, including transport, processing and storage, to cope with the rapid increase in urban and other market demand Closely related to marketing is the need to reduce post-harvest losses, caused by the depredations of various pests and other deterioration Most of the information on such losses is so localized that any over-all estimate of the amount of food lost in this way is pure speculation, but there is no doubt that their reduction could greatly add to the available food supplies

57 In view of the highly unsatisfactory nutritional status of so many people, policy measures are needed not only to increase food production and supplies and improve their marketing, but to achieve a better use and distribution of the supplies that are actually available Such measures include nutrition education, special feeding programmes and the enrichment of the nutritional quality of food-stuffs at either the plant-breeding or the processing stage In order to identify more precisely the target groups for nutritional programmes, a main need is for far more household consumption surveys by socio-economic groups

58 As was stressed earlier, any substantial improvements in nutrition depend mainly upon the alleviation of poverty, in which the reduction of unemployment and underemployment must play a large part. A major problem for agricultural development policy, and one that is partially caused by rapid population growth, is to achieve a sufficiently rapid and widespread expansion of employment opportunities to keep up with the continued increase in the agricultural labour force and make some inroads into the heavy backlog of underemployment.

59. If food production can be increased as fast as is needed in the developing countries, this will itself contribute greatly to the expansion of employment. However, many special measures are also necessary to increase employment as fast as possible. Moreover, especially when they involve the concentration of scarce government resources and services on the smaller farmers whose labour input per hectare of land is the highest, these measures may sometimes entail trade-offs with the production objective. Thus the two principal agricultural development policy objectives induced by rapid population growth may occasionally be in conflict.

60 Perhaps the most important of the [illegible] measures required to increase agricultural employment is the formulation of technological policies that are [illegible] in line with the labour-abundant, capit[illegible] land-scarce factor endowment of [illegible]

countries. This especially includes a more selective approach to mechanization. Adjustments are needed in various fiscal and related policies that distort the relative prices of capital and labour so that they do not reflect these factor endowments. In many countries, little progress can be made in increasing agricultural employment without expanding the number of viable family farms (or establishing co-operative or collective farms) by means of land reform. If the redistribution of land is combined with suitable measures to provide supporting services and establish farmers' organizations, it can contribute greatly not only to employment, but to the incentives and possibilities for increasing production faster, and to the greater participation of rural people in both the decisions concerning development and its benefits. The need is also being increasingly recognized for integrated policies for rural development, which take account of rural non-agricultural as well as agricultural employment, rural social services and amenities, the decentralized development of towns in rural areas and public works programmes to use the current abundant labour supply to construct the infrastructure needed for the future.

61. Better integration is also needed between population policies and economic and social development policies. The foregoing discussion has been concerned with the implications of rapid population growth for agricultural and rural development policies. It is clear that the scale of many of the problems in the agricultural sector would be reduced if population growth could be slowed down. It is also necessary to take into consideration the reverse relation: the impact of agricultural development on demographic change.

62. This aspect has only recently begun to receive attention, and no general conclusions can yet be drawn.[12] The effects of better nutrition on mortality and of land settlement on the geographical distribution of the population are, of course, well known. The crucial question is, however, whether the improvements brought by different patterns of agricultural development will eventually lead to changes in attitudes to family size through such factors as increased opportunity costs of children, increased aspirations, lower child mortality, changes in group norms, values and traditions, migration, non-agricultural employment, female employment and age at marriage. It is sometimes argued that an egalitarian and labour-intensive development strategy leads to attitudes which favour smaller families, and that the "green revolution" will have important consequences in this respect. While further research is still needed, the limited available evidence does not appear to justify the expectation that such developments alone will lead to lower birth rates, although they may be a necessary condition for them. Any decline in population growth may be considerably delayed because some forces may be set in motion which tend to maintain high birth rates, and because the necessary institutional and attitudinal transformations will evolve only slowly.

63. If, therefore, it is desired to reduce the rate of population growth, agricultural development will have to be accompanied by family planning and related educational and motivational programmes, in order to exploit "such favourable factors as greater child survival, growing consumption aspirations, rising incentives to invest in the farm, the greater cost of children who go to school longer, and (eventually) a growing sense of economic self-reliance among parents who have benefited from agricultural advances".[13] Such considerations are the basis of the population-motivation programmes in which FAO is assisting a number of countries, making use in particular of the contacts with rural families established by agricultural and home economics extension services.

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[12] See E. Mueller, "The impact of agricultural change on demographic development in the third world", in *Proceedings of the International Population Conference, Liège, 1973* (Liège, International Union for the Scientific Study of Population, 1973), vol. 1, pp. 425-439. This paper, on which the present summary is largely based, contains the most comprehensive review available of the studies so far undertaken.

[13] *Ibid.*, p. 437.

ANNEX

TABLE 6. POPULATION AND FOOD SUPPLY IN INDIVIDUAL COUNTRIES

	Population		*Food production*[a]	*Domestic demand for food*[b c]	*Dietary energy supply*[c d]		*Protein supply*[c d]
	Rate of growth[c] *(percentage per annum)*	*Density (persons per hectare)*[g]	*Rate of growth*[a] *(percentage)*	*Rate of growth*[a] *(per annum)*	*Per capita per day (kilocalories)*	*Percentage of requirements*[f] *(percentage)*	*Per capita per day (grams)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Developed countries							
Albania	2.8	3.8	3.6	4.6	2 370	98	71
Australia	2.1	0.3	3.7	2.4	3 050	115	101
Austria	0.4	4.4	2.5	1.1	3 340	127	89
Belgium-Luxembourg	0.6	11.0	2.1	1.2	3 390	128	94
Bulgaria	0.8	1.9	4.3	2.8	3 300	132	97
Canada	2.2	0.5	2.2	2.5	3 190	120	98

TABLE 6 (continued)

	Population		Food production [a]	Domestic demand for food [b,c]	Dietary energy supply [d,e]		Protein supply [d,e]
	Rate of growth [c] (percentage per annum)	Density (persons per hectare) [g]	Rate of growth [a] (percentage)	Rate of growth [a] (per annum)	Per capita per day (kilocalories)	Percentage of requirements [f] (percentage)	Per capita per day (grams)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Czechoslovakia	0.9	2.8	1.8	1.9	3 190	129	90
Denmark	0.7	1.8	1.6	1.3	3 230	120	91
Finland	0.8	1.7	2.4	1.1	3 020	111	91
France	1.0	2.6	3.0	2.0	3 210	127	104
German Democratic Republic	−0.3	3.6	1.6	0.8	3 400	130	84
Germany, Federal Republic of	1.0	7.3	2.5	1.9	3 230	121	88
Greece	0.8	2.5	4.0	2.3	2 900	116	99
Hungary	0.5	1.8	3.0	1.9	3 180	121	98
Ireland	0.1	2.6	1.7	0.3	3 420	136	103
Israel	3.4	7.0	7.7	4.9	2 970	116	92
Italy	0.7	3.6	2.9	2.3	3 170	126	100
Japan	1.1	18.5	4.3	3.7	2 470	106	76
Malta	0.1	20.0	3.2	1.2	2 680	108	86
Netherlands	1.3	15.0	3.0	1.7	3 290	122	84
New Zealand	2.1	3.7	2.7	2.0	3 330	126	107
Norway	0.9	4.8	1.3	1.3	2 920	109	87
Poland	1.4	2.1	3.0	2.3	3 270	125	99
Portugal	0.6	2.2	1.7	2.3	2 890	118	85
Romania	1.1	1.9	3.2	2.7	3 120	118	92
South Africa	2.4	1.7	3.9	3.2	2 730	111	77
Spain	0.9	1.6	3.4	3.0	2 620	107	81
Sweden	0.7	3.9	0.9	1.0	2 800	104	84
Switzerland	1.5	15.6	1.7	1.9	3 250	121	91
USSR	1.5	1.7	3.9	3.0	3 280	128	101
United Kingdom	0.5	7.7	2.8	0.7	3 140	125	90
United States of America	1.5	1.2	2.0	1.6	3 270	124	97
Yugoslavia	1.2	2.5	4.5	2.4	3 140	124	92
Developing countries							
Afghanistan	1.9	1.9	1.7	2.2	1 950	80	56
Algeria	2.4	2.0	-0.8	3.4	1 710	71	45
Angola	1.8	6.1	2.7	2.6	1 910	81	40
Argentina	1.7	0.9	1.8	2.0	3 150	119	99
Bangladesh	3.5[h]	8.2	1.6[h]		1 860	80	39
Barbados	0.6	9.2	−0.1				
Bolivia	2.3	1.6	5.0	2.9	1 840	77	46
Botswana	2.0	1.2	2.3		2 040	87	65
Brazil	3.0	3.1	4.4	4.0	2 600	109	64
Burma	2.2	1.7	2.4	3.1	2 230	103	49
Burundi	2.0	3.0	2.4	2.4	2 330	100	61
Central African Republic	1.8	0.3	2.8	1.1	2 170	96	48
Chad	2.1	0.5	0.9	1.2	2 060	86	73
Chile	2.5	2.1	2.2	3.3	2 460	101	71
China	1.7	7.7	2.3		2 370	100	63
Colombia	3.3	4.0	3.1	3.9	2 250	97	51
Congo	1.9	1.5	2.2	3.7	2 160	97	40
Costa Rica	3.8	1.8	5.4	4.8	2 470	110	63
Cuba	2.2	2.4	1.1	2.0	2 500	108	63
Cyprus	1.1	1.5	5.4	2.3	2 460	99	78
Dahomey	2.3	1.8	1.5	0.1	2 250	98	55
Democratic Yemen	2.4	3.1	1.6	−1.0	2 020	84	56
Dominican Republic	3.3	4.1	2.2	3.6	2 060	91	50
Ecuador	3.3	1.6	5.4	4.0	2 040	89	49
Egypt	2.6	11.7	3.4	3.8	2 360	94	66
El Salvador	3.0	5.5	3.6	4.1	1 890	82	51
Ethiopia	1.8	2.0	2.3	3.0	2 150	92	69
Gabon	0.6	3.9	3.6	2.4	2 210	94	56
Gambia	1.8	2.9	4.4		2 370	100	63
Ghana	2.9	3.1	3.9	3.2	2 200	96	46
Guatemala	3.0	3.5	4.1	4.2	2 120	97	59
Guinea	2.0	2.6	2.0	3.4	2 040		44
Guyana	3.0	0.9	2.5	3.6	-		47

TABLE 6 (*continued*)

	Population: Rate of growth[a] (percentage per annum) (1)	Population: Density (persons per hectare)[g] (2)	Food production[a] — Rate of growth[a] (percentage) (3)	Domestic demand for food[b c] — Rate of growth[a] (per annum) (4)	Dietary energy supply[c d]: Per caput per day (kilocalories) (5)	Dietary energy supply[c d]: Percentage of requirements[f] (percentage) (6)	Protein supply[c d]: Per caput per day (grams) (7)
Czechoslovakia	0 9	2 8	1 8	1 9	3 190	129	90
Denmark	0 7	1 8	1 6	1 3	3 230	120	91
Finland	0 8	1 7	2 4	1 1	3 020	111	91
France	1 0	2 6	3 0	2 0	3 210	127	104
German Democratic Republic	−0 3	3 6	1 6	0 8	3 400	130	84
Germany, Federal Republic of	1 0	7 3	2 5	1 9	3 230	121	88
Greece	0 8	2 5	4 0	2 3	2 900	116	99
Hungary	0 5	1 8	3 0	1 9	3 180	121	98
Ireland	0 1	2 6	1 7	0 3	3 420	136	103
Israel	3.4	7 0	7 7	4 9	2 970	116	92
Italy	0 7	3 6	2 9	2 3	3 170	126	100
Japan	1 1	18 5	4 3	3 7	2 470	106	76
Malta	0 1	20 0	3 2	1 2	2 680	108	86
Netherlands	1 3	15 0	3 0	1 7	3 290	122	84
New Zealand	2 1	3 7	2 7	2 0	3 330	126	107
Norway	0 9	4 8	1 3	1 3	2 920	109	87
Poland	1 4	2 1	3 0	2 3	3 270	125	99
Portugal	0 6	2 2	1 7	2 3	2 890	118	85
Romania	1 1	1 9	3 2	2 7	3 120	118	92
South Africa	2 4	1 7	3 9	3 2	2 730	111	77
Spain	0 9	1 6	3 4	3 0	2 620	107	81
Sweden	0 7	3 9	0 9	1 0	2 800	104	84
Switzerland	1.5	15 6	1 7	1 9	3 250	121	91
USSR	1 5	1 7	3 9	3 0	3 280	128	101
United Kingdom	0 5	7 7	2 8	0 7	3 140	125	90
United States of America	1 5	1 2	2 0	1 6	3 270	124	97
Yugoslavia	1 2	2 5	4.5	2 4	3 140	124	92
Developing countries							
Afghanistan	1 9	1 9	1 7	2 2	1 950	80	56
Algeria	2 4	2 0	−0 8	3 4	1 710	71	[illegible]
Angola	1 8	6 1	2 7	2 6	1 910	81	40
Argentina	1 7	0 9	1 8	2 0	3 150	119	[illegible]
Bangladesh	3 5[h]	8 2	1 6[h]	. .	1 860	80	[illegible]
Barbados	0 6	9 2	−0 1	.	. .	. . .	[illegible]
Bolivia	2 3	1 6	5 0	2 9	1 840	77	[illegible]
Botswana	2 0	1 2	2 3	. . .	2 040	87	[illegible]
Brazil	3 0	3 1	4 4	4 0	2 600	[illegible]	[illegible]
Burma	2.2	1.7	2 4	3 1	2 230	[illegible]	[illegible]
Burundi	2 0	3 0	2 4	2 4	2 330	[illegible]	[illegible]
Central African Republic	1 8	0 3	2 8	1.1	2 170	[illegible]	[illegible]
Chad	2 1	0 5	0 9	1.2	2 060	[illegible]	[illegible]
Chile	2 5	2.1	2 2	3 3	2 460	[illegible]	[illegible]
China	1 7	7.7	2 3	. . .	[illegible]	[illegible]	[illegible]
Colombia	3.3	4 0	3 1	3 9	[illegible]	[illegible]	[illegible]
Congo	1 9	1.5	2 2	3 7	[illegible]	[illegible]	[illegible]
Costa Rica	3 8	1 8	5 4	4 8	[illegible]	[illegible]	[illegible]
Cuba	2 2	2 4	1 1	2.0	[illegible]	[illegible]	[illegible]
Cyprus	1 1	1.5	5 4	2.3	[illegible]	[illegible]	[illegible]
Dahomey	2 3	1 8	1.5	0.1	[illegible]	[illegible]	[illegible]
Democratic Yemen	2 4	5 1	1 6	[illegible]	[illegible]	[illegible]	[illegible]
Dominican Republic	3 3	4 1	2 2	[illegible]	[illegible]	[illegible]	[illegible]
Ecuador	3.3	1 6	5 4	[illegible]	[illegible]	[illegible]	[illegible]
Egypt	2 6	11 7	3 4	[illegible]	[illegible]	[illegible]	[illegible]
El Salvador	3 0	5.5	3 6	[illegible]	[illegible]	[illegible]	[illegible]
Ethiopia	1 8	2 0	2.3	[illegible]	[illegible]	[illegible]	[illegible]
Gabon	0 6	3 9	3 6	[illegible]	[illegible]	[illegible]	[illegible]
Gambia	1 8	2.9	4 4	[illegible]	[illegible]	[illegible]	[illegible]
Ghana	2 9	3 1	3.9	[illegible]	[illegible]	[illegible]	[illegible]
Guatemala	3 0	3.5	4 1	[illegible]	[illegible]	[illegible]	44
Guinea	2 0	2.6	[illegible]	[illegible]	[illegible]	[illegible]	47
Guyana	3 0	0 9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 6 (*continued*)

	Population		Food production [a]	Domestic demand for food [b c]	Dietary energy supply [c d]		Protein supply [c d]
	Rate of growth [c] (percentage per annum)	Density (persons per hectare) [g]	Rate of growth [e] (percentage)	Rate of growth [e] (per annum)	Per capita per day (kilocalories)	Percentage of requirements [f] (percentage)	Per capita per day (grams)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Haiti	2.3	13.2	1.0	2.2	1 720	76	39
Honduras	3.3	3.1	4.0	4.2	2 180	96	58
India	2.1	3.4	2.4	3.0	2 060	93	53
Indonesia	2.5	3.8	2.0	2.6	1 920	89	43
Iran	2.8	2.5	3.3	6.4	2 080	86	53
Iraq	3.3	1.3	2.8	5.2	2 250	93	62
Ivory Coast	2.2	0.6	4.9	2.6	2 490	108	60
Jamaica	1.9	8.3	1.9	3.3	2 300	103	56
Jordan	3.2	1.7	1.8	6.6	2 310	94	60
Kenya	3.0	6.5	2.6	4.7	2 350	101	71
Khmer Republic	2.8	2.4	3.5	4.3	2 410	109	62
Korea, People's Democratic Republic of	2.7	10.5	...	...	2 240	89	73
Korea, Republic of	2.7	14.0	4.8	4.7	2 420	103	65
Laos	2.4	3.1	3.7	3.7	2 080	94	46
Lebanon	2.8	8.4	5.0	3.1	2 380	96	70
Lesotho	1.6	2.7	0.5	...	...	...	...
Liberia	1.5	0.3	1.1	1.8	2 040	88	36
Libyan Arab Republic	3.6	0.7	5.3	...	2 540	108	61
Madagascar	2.4	2.1	2.8	2.1	2 350	104	53
Malawi	2.5	1.5	4.7	3.7	2 150	93	54
Malaysia (West)	3.0	1.8	5.2	4.3	2 400	107	52
Mali	2.1	0.4	1.6	4.3	2 170	92	69
Mauritania	2.0	4.5	2.4	3.0	2 060	89	75
Mauritius	2.6	8.0	1.3	3.0	2 370	104	50
Mexico	3.4	2.1	5.3	4.3	2 560	110	65
Mongolia	2.9	...	...	...	2 520	113	109
Morocco	3.0	2.8	2.8	3.3	2 400	99	64
Mozambique	1.7	2.8	2.7	3.2	2 190	94	41
Nepal	1.8	5.7	0.1	2.1	2 050	93	52
Nicaragua	3.0	2.3	4.9	3.9	2 380	106	70
Niger	2.8	0.3	4.1	2.2	2 180	93	72
Nigeria	2.4	3.1	2.0	3.1	2 290	97	60
Pakistan	3.0	4.6	3.0	4.2	2 280	99	59
Panama	3.2	2.6	4.3	4.8	2 520	109	61
Paraguay	3.1	2.5	2.6	3.4	2 800	121	74
Peru	2.9	4.8	2.9	3.9	2 310	98	62
Philippines	3.2	4.5	3.2	4.2	1 920	85	45
Rwanda	2.6	4.8	1.8	1.9	2 160	93	62
Saudi Arabia	2.4	6.5	2.9	5.0	2 080	86	56
Senegal	2.2	0.7	3.3	1.2	2 300	97	64
Sierra Leone	2.0	0.7	2.4	3.9	2 240	97	49
Somalia	2.2	2.9	1.1	1.5	1 770	77	57
Southern Rhodesia	3.4	2.9	3.9	4.1	2 550	107	73
Sri Lanka	2.5	6.3	3.6	3.1	2 240	101	50
Sudan	2.9	2.2	4.3	3.9	2 130	91	63
Surinam	3.1	10.3	...	4.0	2 360	103	56
Syrian Arab Republic	3.0	1.0	1.8	4.6	2 530	102	70
Thailand	3.1	3.1	5.3	4.6	2 330	105	52
Togo	2.3	0.9	5.4	2.4	2 160	94	51
Trinidad and Tobago	2.5	7.6	1.9	4.8	2 360	97	64
Tunisia	2.9	1.1	0.8	4.3	2 060	86	54
Turkey	2.7	1.3	3.0	3.8	2 770	110	78
Uganda	2.4	1.7	1.8	3.2	2 230	96	55
United Republic of Cameroon	1.8	0.8	3.3	2.5	2 230	96	59
United Republic of Tanzania	2.4	0.8	3.2	3.1	1 700	73	43
Upper Volta	1.8	1.0	4.7	1.2	1 940	82	66
Uruguay	1.3	1.5	0.8	1.2	2 860	107	96
Venezuela	3.5	2.1	6.1	4.0	2 460	100	62
Viet-Nam, Democratic Republic of	2.7	...	...	...	2 070	100	47
Viet-Nam, Republic of	2.5	5.9	4.3	3.2	2 340	108	52

TABLE 6 (*continued*)

	Population		*Food production* [a]	*Domestic demand for food* [b,c]	*Dietary energy supply* [c,d]		*Protein supply* [c,d]
	Rate of growth [h] *(percentage per annum)*	*Density (persons per hectare)* [g]	*Rate of growth* [e] *(percentage)*	*Rate of growth* [e] *(per annum)*	*Per capita per day (kilo-calories)*	*Percentage of requirements* [f] *(percentage)*	*Per capita per day (grams)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Yemen	2 4	4 8	−0 2	3 9	1 970	81	62
Zaire	2 0	2 4	0 2	2 3	2 040	92	33
Zambia	2 9	0 9	4 3	4 8	2 040	88	64

[a] Food component of crop and livestock production only (i.e., excluding fish production)

[b] Calculated on basis of growth of population and *per capita* income, and estimates of income elasticity of farm value of demand in Food and Agriculture Organization of the United Nations, *Commodity Projections 1970-1980* (Rome, 1971)

[c] Total food, including fish

[d] 1970

[e] Exponential trend 1952-1972

[f] Revised standards of average requirements (physiological requirements plus 10 per cent for waste at household level).

[g] Arable land and land under permanent crops (i.e., excluding permanent meadows and pastures) around 1970

[h] 1962-1972

POPULATION AND AGRICULTURAL PRODUCTIVITY *

Ester Boserup **

1. It is generally agreed that the way to obtain a rapid increase in output per worker in agriculture is to replace the traditional systems by systems based on scientific and industrial inputs into agriculture. However, it would be wrong to jump to the conclusion that this is the only way in which to obtain a substantial increase in total agricultural output during periods of rapid increases in population and in the labour force. When population growth and economic development raise the demand for agricultural products, there are two ways to raise the total output of the agricultural sector. One is to apply more agricultural labour to the available land resources: (*a*) by bringing forest and wasteland into cultivation; (*b*) by turning fallow land and natural grazing land into cultivated land producing fodder for animals currently in the fields; (*c*) by reducing the fallow period; and (*d*) by the expanded use of multiple cropping systems. The other method is to apply increasing amounts of industrial and scientific inputs, such as improved seeds, chemical fertilizer, insecticides and mechanized equipment. It is characteristic of the first approach that it increases the area harvested per year, but with relatively small changes in productivity per hectare harvested and in productivity per man-hour in agriculture, while it is characteristic of the other approach that it raises gross output per man-hour of agricultural labour and per hectare harvested, with little change in the size of the area under cultivation.

2. In this paper, the two methods are here set up against each other as if they were alternative strategies; but this is, of course, an over-simplification. The conditions for achieving more intensive land utilization, especially multicropping, are much better if use is made of chemical fertilizer, insecticides and mechanized equipment. The choice is not to apply one or the other of these methods, but the problem is to choose a combination of the two methods, which is suitable in a region at a given stage of development and with a given set of factor proportions.

3. It is not possible to deal with all aspects of this problem in a short paper, but some light can be thrown upon it by comparing the targets in the Indicative World Plan for Agricultural Development issued by the Food and Agriculture Organization of the United Nations (FAO) with actual events in the 1960s.

4. Some recent papers prepared by the United Nations and FAO contain information which makes it possible to assess the changes in agricultural productivity during the period of rapid population growth in the 1960s. The purpose of the present paper is to combine this information, to examine it critically and to draw some tentative conclusions from it.

5. The Indicative World Plan covers the period 1961-1985. The available information about major inputs according to the plan are reproduced in table 1. The information in the table is given for major geographical regions, because the availability of land varies so much from region to region that over-all figures for all developing regions are of little interest. Population density is much higher in the Asian region than in Latin America and Africa. Some 24 per cent of total land area is under cultivation in the Asian region, against 6-7 per cent in the others, and both the intensity of cropping on arable land (i.e., the ratio of harvested area to arable land) and the percentage of arable land under irrigation is much higher in Asia than in the other regions.

6. It can be seen from table 1 that the Indicative Plan puts the main emphasis on the use of industrial inputs, as illustrated by the rapidly rising inputs of fertilizer, pesticides and tractors. In contrast with the very rapid increase in use of these inputs, the planned increases in arable land and in cropping intensity are of modest dimensions. Arable land in the Asian region is assumed to increase by only 6 per cent in a period of 23 years, although considerable land reserves still remain in some parts of this region and although very little progress has yet been made in shifting over from the grazing of animals on common pastures to fodder production. In those parts of the world where as little as 6-7 per cent of the land is used in cultivation, FAO assumes that the area of arable land will increase moderately by 25-30 per cent, that is to some 8-9 per cent of the land area. The targets for the increase in cropping intensity are very modest in all regions. The cropping intensity in the Asian region will presumably be only 1:21 in 1985.

* The original text of this paper (E/CONF.60/SYM.I/21) was submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

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TABLE 1. USE OF INDUSTRIAL INPUTS AND LAND ACCORDING TO THE INDICATIVE WORLD PLAN FOR AGRICULTURAL DEVELOPMENT

		ECAFE/ESCAP region a	Latin America	Africa south of Sahara
Industrial inputs				
Fertilizer, kilo per hectare harvested (nutritive content)	1962	6	12	1
	1985	80	64	7
Pesticides, dollars per hectare harvested (in constant prices)	1962	0 10	2 00	0.20
	1985	4 50	5.20	3 10
Tractors per 100 hectares harvested (adjusted for differences in size)	1962	0 4	5 0	0.3
	1985	4 1	8 0	0 6
Intensity of land use				
Arable land as percentage of total land area	1970	24	6	7
Percentage increase of arable land	1962-1985	6	30	24
Intensity of cropping on arable land (harvested area divided by arable area)	1962	1 00	0 54	0 42
	1985	1 21	0 60	0.52
Percentage of arable land under irrigation	1962	21	8	1
	1985	31	10	1

[illegible]

7. The Indicative Plan contains specific targets for the period 1961-1975. In a recent FAO publication,[1] these targets are compared with actual performance in the period from 1961-1963 to 1969-1971, with specification for the output of major products and for the area harvested of major cereals This makes it possible to derive figures for yields per crop hectare. The FAO comparisons, together with figures for changes in the *agricultural labour force between 1960 and 1970* released by the United Nations,[2] were used to compute the figures in table 2.

8 In evaluating the figures for crop yields per hectare in table 2, it must be taken into account that two of the three years, 1969-1971, were years of unusually unfavourable weather over large parts of the world Nevertheless, the shortfall in relation to the targets is so large in both Asia and Latin America that it is unlikely that the 1975 targets for crop yields of cereals will be met. In the Asian region, FAO had expected crop yields per hectare harvested to increase by no less than 3 per cent per annum, but the increase has been only 2 per cent per annum It is important to note that this is mainly due to over-estimation of the effect rather than of the amount of industrial inputs Fertilizer inputs in the Asian region increased by 16 per cent as against a target of 17 per cent, two-wheel tractors increased by 28 per cent against a target of 19 per cent and four-wheel tractors 16 per cent against a target of 13 per cent Irrigation seems to be the *only input which has fallen short of expectation* The main reason for the shortfall in cereal yields in the Asian region is that the "green revolution" has hitherto affected paddy production far less than wheat production.

9. Fortunately, some part of the shortfall in yields was offset by a substantially larger expansion of area sown than was foreseen An increase of 0 7 per cent per annum had been expected by FAO, while actual performance was 1.1 per cent per annum This is of the same order of magnitude as the increase of the agricultural labour force, so that the area of cereals harvested per worker in agriculture was roughly [illegible]

10 In contrast with Asia, cereal production in Latin America came close to the FAO targets, but there also with more expansion of area and much less increase of productivity per hectare harvested than was foreseen by the FAO. In Latin America, the [illegible] in yield increase goes [illegible]

[1] Food and Agriculture Organization of the United Nations, "Agricultural production in developing countries in relation to the targets for the Second United Nations Development Decade", *Monthly Bulletin of Agricultural Economics and Statistics*, vol XXII, No 4 (April 1973), pp 1-17.

[2] [illegible]

TABLE 2. INDICATORS OF AGRICULTURAL PROGRESS IN THE PERIOD 1961-1963–1969-1971, COMPARED WITH THE INDICATIVE WORLD PLAN FOR AGRICULTURAL DEVELOPMENT FOR THE PERIOD 1961-1963–1975

(Percentage)

	Annual rates of increase					
	ECAFE/ESCAP region [a]		*Latin America*		*Africa south of Sahara*	
	Actual	*Target*	*Actual*	*Target*	*Actual*	*Target*
Population	2.7	2.5	2.9	2.9	2.4	2.6
Labour force	2.0	...	2.3	...	2.0	...
Agricultural labour force	1.0	...	0.9	...	1.3	...
Area of cereals harvested per worker	0.1	...	1.6	...	–0.1 [b]	...
Area of cereals harvested	1.1	0.7	2.5	2.1	1.2 [b]	2.1
Yields of cereals per hectare harvested	2.0	3.0	0.8	1.4	1.3	1.0
Output of cereals	3.1	3.7	3.3	3.5	2.5 [b]	3.1
Output of starchy roots	5.5	3.9	4.7	2.5	2.7	2.5
Output of livestock products	2.3	2.7	2.8	3.0	2.7	3.3
Total output of agriculture	2.7	3.6	2.9	3.0	2.6 [b]	3.2
Gross national product *per capita*	2.2	3.4	2.4	2.5	2.2 [b]	2.3
Agricultural output *per capita*	0.0	1.1	0.0	0.1	0.2 [b]	0.6
Output of cereals *per capita*	0.4	1.2	0.4	0.6	0.1 [b]	0.5
Output of starchy roots *per capita*	2.8	1.4	1.8	–0.4	0.3	–0.1
Output of livestock products *per capita*	–0.4	0.2	–0.1	0.1	0.3	0.7
Output per worker in agriculture	1.7	...	2.0	...	1.3 [b]	...
Gross national product per worker in total labour force	2.9	...	3.2	...	2.5 [b]	...
Ratio of increase of agricultural output per worker to ratio of increase of output per worker in total labour force	0.6	...	0.6	...	0.5 [b]	...

SOURCES: Manpower figures compiled from *Implementation of the International Development Strategy: Papers for the First Over-all Review* (United Nations publication, Sales No. E.73.II.A.3), vol. II, pp. 78-80. Agricultural figures compiled from Food and Agriculture Organization of the United Nations, "Agricultural production in developing countries in relation to the targets for the Second United Nations Development Decade", *Monthly Bulletin of Agricultural Economics and Statistics*, vol. XXII, No. 4 (April 1973), pp. 1-17.

[a] Region covered by the United Nations Economic Commission for Asia and the Far East, now designated Economic and Social Commission for Asia and the Pacific; excluding China.

[b] Figures underestimated by either national or FAO statisticians.

of fertilizer than expected (14 per cent increase per annum against a FAO target of 22 per cent per annum). It is natural that in Latin America, with its large availability of uncultivated land, the area under cultivation should increase rather than productivity per hectare. The only surprising fact is that FAO had not foreseen that Latin American agriculturalists, with an increasing labour force and large amounts of uncultivated land, would make this choice.

11. In contrast with the other regions, Africa had a larger increase of productivity per hectare harvested than the target set by FAO, which was as low as 1 per cent per annum. It might seem that Africa is exceptional also in having a lower rate of increase of area harvested than the FAO target, but here the figure shown in the table is spurious. The large shortfall in area harvested in Africa is in subsistence crops for which hardly any statistics are available. For instance, the FAO target for area harvested under millet and sorghum is a 2 per cent increase per annum, but the actual increase is given by FAO as 0.8 per cent per annum, i.e. less than two thirds of the increase in the African agricultural labour force. This is almost certainly due to considerable underestimation by either national statistical offices or by FAO statisticians or both. The underestimate of the increase of area under subsistence crops affects most of the figures for Africa.

12. In comments on developments during the 1960s, FAO emphasizes that agricultural output increased only in step with over-all population increase, so that *per capita* availabilities remained unchanged, as shown in table 2. It must be taken into account, however, that this is due to a less than proportionate increase of some export crops which suffer from marketing problems and to a relatively slow increase of some livestock products. Output of cereals per head of population did, in fact, increase by 0.4 per cent per annum and output of starchy roots much more, while output of livestock products *per capita* increased little or declined. What happens, apparently, is that under population pressure consumption is shifted from land-using products like mutton, beef and milk to cereals and starchy roots. Similar changes of consumption apparently took place during the nineteenth century demographic transition in Europe.

13. With agricultural output increasing by a little less than 3 per cent per annum and with the agricultural labour force increasing by about 1 per cent, gross output

per worker increased between 1.7 and 2 per cent per annum in the regions in question. Part of the expansion of output per worker was probably due to a larger number of hours of work per year and worker, brought

the rapid population increase, this development in agricultural productivity cannot be described as unsatisfactory, although it must be noted that the increase of net income was smaller, since the rapid increase of total output was obtained by means of increasing amounts of industrial inputs. It must, however, also be noted that the increase of agricultural labour productivity is considerably lower than the increase of

productivity per worker in the economy as a whol can be seen from the table 2 The result is tha already wide gap between agricultural and non- cultural incomes is steadily widening, except for where sectoral terms of trade move in favou agriculture.

14. There is much concern that rural-urban m tion, in most parts of the world, will be greater can be absorbed by the labour market in urban nomies This trend is likely to continue while productivity gap is widening, unless support is to agricultural income from other sectors of nat economies, since it is unlikely that the solution come about as a result of improvements in the t of trade for agricultural exports.

POPULATION GROWTH, LABOUR ABSORPTION AND INCOME DISTRIBUTION*

*Dharam P. Ghai***

1. Despite the great concern with the problems of unemployment and income distribution in developing countries that has arisen in recent years, the literature on population has tended to assign them a minor place. The great majority of the work on the subject has dealt with the impact of differential rates of population growth on such variables as economic expansion, increase in *per capita* income, rural-urban migration and urbanization, and on the attainment of goals in education, health, housing and similar welfare services. While employment expansion and income distribution are obviously affected by these variables, they have seldom been explored in a systematic manner.[1] The central concern of the qualitative work, as well as of the quantitative demographic-economic models, has been with the over-all measures of economic growth and structure. As in other writings on development, it has often been assumed implicitly that the favourable effects of slower population growth on economic growth demonstrated by these models have a correspondingly favourable impact on employment and income distribution. Yet, it is known from a growing number of studies that high rates of economic expansion sustained over one or two decades may fail to make a significant dent in the problems of unemployment and poverty and may indeed intensify them.[2]

2. The purpose of this paper is to explore the main relationships between population growth, employment expansion and changes in distribution of income. These relationships are extremely complex with an intricate pattern of links and feedbacks not only among these variables, but between them and a host of other economic, sociological, political and institutional variables. In a short paper such as this, it is obviously not possible to do justice to these complexities. This paper attempts to isolate the main factors which bear on these issues. It is essentially of a speculative and conjectural nature, drawing heavily on the pioneering work of other writers on the subject.

3. First there is a brief summary of the growing consensus on the impact of differential rates of population growth on economic expansion in developing countries. The purpose of this section is to highlight the economic consequences of alternative rates of population growth as spelt out in a number of economic-demographic models. With this as background, there follows a consideration of the specific employment and income distribution effects of differential rates of population growth. At this stage, the discussion is broadened by critically examining the realism and limitations of the assumptions made in the conventional economic-demographic models and by taking explicit account of some relevant factors left out of these models.

POPULATION GROWTH AND ECONOMIC EXPANSION

4. The impact of population on economic development is isolated by an analysis of the process of economic growth of a country under alternative rates of population growth. It is generally assumed that, while mortality trends follow more or less the same path, the difference in rates of population growth results from differences in the decline in fertility rates. The different rates of population growth then affect the aggregate output, *per capita* output and structure of the economy through their effect upon the basic inputs of land, labour and capital. While different models differ in their methodology, the level of disaggregation and the number of parameters used, they yield basically similar results with respect to projections of output and economic structure.[3]

5. The main results of projections made by these models may be summarized as follows:

(*a*) The level of aggregate output over a given period as well as during the period, usually taken as 30 years from the time the decline in fertility begins, will tend to be higher under a declining fertility compared with the case under constant fertility;

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[1] A notable exception is the work that is being carried out under the World Employment Programme of the International Labour Organisation, in which a major cluster of research projects is concerned specifically with the employment implications of population growth. See International Labour Organisation, *Research Oriented Activities of the World Employment Programme* (Geneva, 1973).

[2] D. Turnham, *The Employment Problem in Less Developed Countries* (Paris, Organisation for Economic Co-operation and Development, Development Centre, 1971).

[3] A convenient summary of the main characteristics and results of these models is to be found in T. K. Ruprecht and C. Wahren, *Population Programmes and Economic and Social Development* (Paris, Organisation for Economic Co-operation and Development, Development Centre, 1970), chap. II.

(*b*) The *per capita* advantage of declining fertility will be greater and will increase cumulatively over time;

(*c*) The economy will have a more "modern" structure under declining fertility, as reflected in the relatively greater share of manufacturing, transportation and communications and the relatively smaller share of agriculture in total output

6. The interest of these projections lies not only in the qualitative but, perhaps even more, in the quantitative differences under alternative assumptions of rates of population growth Here, clearly, the values assumed for various parameters, such as marginal savings and capital-output ratios, become crucial

7. The results derived from most models typically indicate that "the advantage of fertility reduction amounts to a *per capita* income advantage of approximately 3-5 per cent after 10 years, 15-25 per cent after 20 years, and 25-50 per cent after 30 years" [4] The fundamental reason for results of this sort is that over a period of, say, from 20 to 30 years, high fertility leads to a much larger size of population than declining fertility, while the number in the productive age groups shows only a small difference Thus, a larger fraction of any given national output has to be allocated to current consumption Furthermore, a larger proportion of the resources available for development has to be allocated for education, health, housing and other social overheads in the high fertility case, as the proportion of children is much higher than under conditions of declining fertility. The lower consumption per worker may also lead to lower productivity due to poor health, malnutrition etc.

8. It may be argued that the disadvantages of high fertility may be more than compensated for in the long run when higher birth rates begin to make an impact on the size of the labour force It can, however, be shown within the framework of the demographic-economic models referred to earlier, that the advantages of higher initial *per capita* income, the lower burden of dependency and proportionately larger development outlays under reduced fertility will continue to widen the gap in *per capita* incomes and *per capita* consumption, though the aggregate output may exceed under high fertility on the basis of favourable assumptions about the employment prospects and productivity of the additional labour force [5]

9. There are also offsetting factors at work in the other direction the pressure of increasing population, and the persistent demands for more and better education, health and services, may spur additional effort on the part of individuals and Governments, and may lead to harder work and higher savings and development outlays. However, it is also possible that in some countries with centuries of poverty and miserable levels of living, pressure of population may merely intensify the existing apathy and fatalism The fundamental factors in economic development, although impossible to quantify, are the way the Government organizes the economy, whether the people are motivated by material or other incentives to work and save, whether the fruits of growth are equitably distributed and whether the energies of people are purposefully mobilized and engaged in the tasks of development There is no reason to believe that differential rates of population growth *per se* have any independent influence on these fundamental prerequisites of economic development.

Population and employment

10 With this background on the general impact on economic growth of differential rates of population growth, it is possible to turn to the more specific effects on employment [6] First, there is an examination of the impact of differential rates of population growth on the supply of labour and then a discussion of their effect on employment expansion

Population growth and labour supply

11 The task of relating population growth to labour supply is relatively simple, at any rate if one makes a number of simplifying assumptions which, however, do not unduly distort realities Differences in the growth rates of population may derive from differing trends in mortality or fertility and these will have different effects on the size and age distribution of the population However, it is generally assumed that, for a number of reasons, differences in mortality rates, as a primary explanation of different rates of population growth, are less important and significant [7] Therefore, most analyses of population and economic growth explore the impact of differential rates of population growth caused by differing trends in fertility rates The resultant differences in the size of the labour force can be contrasted easily, assuming unchanged high fertility in one case and a linear reduction over a given period in the other case

12 It can be shown that, while differential fertility rates make very little relative difference to the labour force age groups during the first 15-30 years after the onset of decline in fertility, these differences widen progressively over time [8] The implications for employ-

[4] *Ibid*, p 20

[5] A J. Coale and E M Hoover, *Population Growth and Economic Development in Low-Income Countries A Case Study of Indian Prospects* (Princeton, New Jersey, Princeton University Press, 1958).

[6] Throughout this paper, "employment" is defined to include all productive work It is, therefore not to be confused with "wage employment"

[7] N Keyfitz, "Changes of birth and death rates and their demographic effects", in National Academy of Sciences, *Rapid Population Growth Consequences and Policy Implications* (Baltimore, Maryland, Johns Hopkins Press, 1971), vol II

[8] Some of them are mentioned in R Jolly, "Employment [illegible]

[illegible] countries, include the significant contribution made by children to household income, the manner in which the attitude towards female participation in the labour force varies with social and cultural traditions etc D Turnham, *op cit.*, chap II

POPULATION GROWTH AND UNEMPLOYMENT AND UNDEREMPLOYMENT

21. An attempt can now be made to bring together the supply and demand sides of the equation to assess the direction of change of differential rates of population growth on unemployment and underemployment. The foregoing discussion of the positive and negative effects on net labour absorption is summarized in table 1.

TABLE 1. IMPACT ON GROWTH OF UNEMPLOYMENT OF DIFFERENTIAL POPULATION GROWTH RATES

	High fertility	*Reduced fertility*
Supply of labour		
First 15 years		
Numbers in working-age group	0	0
Participation	+	—
After 15 years		
Numbers in working-age group	—	+
Participation	+	—
Labour absorption		
Capital accumulation	—	+
Productivity changes		
(a) Technical change .... (b) Impact of nutrition on existing labour force .... (c) Impact of nutrition, education and training on new labour	+	—
Composition of output	+[a]	—[a]
Pattern of growth	?	?

Note. Minus (—) indicates an increase in effective labour supply or a relative decrease in labour absorption; plus (+) indicates the opposite pattern.

[a] Depending upon conditions as specified in the text.

22. The over-all effect of differential rates of population increase on the growth of unemployment and underemployment will naturally depend upon the quantitative value of the positive and the negative effects on net labour absorption. This has not been attempted in the paper. While the economic-demographic models attempt to quantify these effects, for the most part they fail to incorporate in these models such crucial relationships as the effect of differential rates of population growth on participation rates of working-age population, the impact on productivity of improved nutrition, education and training, the structural imbalances in the labour supplied and demanded, the impact of rapid capital accumulation on technical change, intersectoral differences in productivity growth and the pattern of growth. Although the incorporation of such relationships in models presents extremely difficult conceptual and empirical problems and would add greatly to their complexity, their neglect must necessarily lead to partial, misleading and often contradictory results.

23. It is likely that lower fertility makes it potentially easier to solve problems of unemployment and underemployment. Even the apparently negative effects on net labour absorption of reduced fertility, such as higher participation rates and improvement in productivity brought about by various factors listed above, could be turned to advantage if appropriate policies are followed in such diverse fields as the level and structure of factor prices, the functioning of the labour market, the adoption of appropriate technology, educational and training systems; and the pursuit of a broadbased development effort. Experience thus far does not indicate that the performance in this respect varies in any systematic manner with *per capita* differences among developing countries, or that potentially favourable effects of lower fertility could be turned to the advantage of maximum net labour absorption. But the understanding of the complex factors determining labour absorption has been greatly increased in recent years, and, thus, the past experience cannot necessarily be taken as a valid guide to future performance.

POPULATION GROWTH AND INCOME DISTRIBUTION

24. The relationship between population growth and changes in income distribution has received very little attention in the literature. [18] Most studies of the effect of population growth on economic expansion indicate rising *per capita* income advantages over time associated with lower fertility, but on income distribution, they contain only a few *obiter dicta* indicating improved income distribution under lower population growth. More work has been done on the general relationship between income distribution by size and the stage of economic development. [19] These studies have been concerned with changes in size distribution of income, both with rising levels of *per capita* income in a given country and with the cross-section analysis of countries, both developed and developing, with different *per capita* income levels. The main findings of some of these studies may be summarized as follows:

(*a*) If income distribution is measured by the share of income accruing to, say, the top 5-10 and the bottom 20-40 per cent of households, there seems to be some evidence that income inequalities widen in the early stages of development, followed by a period of relative stability, and a narrowing of inequalities at a later

[18] J. Kocher, *Rural Development, Income Distribution, and Fertility Decline* (New York, The Population Council, 1973).

[19] S. Kuznets, "Substantive aspects of the economic growth of nations: VIII, distribution of income by size", *Economic Development and Cultural Change*, vol. XI, No. 2, part II (January 1963), pp. 1-80; S. Kuznets, *Modern Economic Growth: Rate, Structure, and Spread* (New Haven, Connecticut, Yale University Press, 1966), chaps. IV and VII; F. Paukert, "Income distribution at different levels of development: a survey of evidence", *International Labour Review*, vol. CVIII, Nos. 2-3 (August-September 1973), pp. 97-125.

in more "modern" techniques of production and, consequently, to widen inequalities by contributing to the growth of unemployment and underemployment.

31. Lastly, the changing nature of the skill composition of the labour force has an important effect on income distribution.[25] A major source of income inequality in most countries is the skill differences in the labour force In particular, in most countries in Africa, and in a number of countries in South America, the Middle East and South-East Asia, high-level skills command huge premiums A slower rate of population growth, which permits higher *per capita* expenditure on training and education, should have a more favourable effect on income distribution through a reduction in the relative scarcity of highly trained and skilled manpower.

32. The various strands of the discussion on the effect of differential population growth rates on income distribution by size are summarized in table 2

TABLE 2 EFFECT OF POPULATION GROWTH ON INCOME DISTRIBUTION

Sources of income inequality	*High fertility*	*Reduced fertility*
Ratio of labour to reproducible capital	−	+
Ratio of labour to non-reproducible capital	−	+
Distribution of assets	+[a]	−[a]
Structural changes	+	−
Technical change	+	−
Skill composition of labour force	−	+

Note Minus (−) indicates worsening income distribution, plus (+) indicates improving income distribution

[a] Likely under capitalist pattern of development

33 As in the earlier discussion on employment, the final outcome will depend upon the quantitative significance of these and other effects. It is certainly likely, as the historical studies show, that in the absence of active government policies in a wide range of fields, the faster economic growth associated with reduced fertility could widen income inequalities over long periods in the early stages of development under capitalism through the quantitatively powerful effects of structural changes and growing concentration of ownership of assets.

34. In conclusion, two qualifications should be made with regard to the foregoing analysis. In the first place, this paper has been largely concerned with the structure of income distribution, i e, relative shares going to a given percentage of the upper and lower income groups of the population. It is likely, though by no means certain, that even if reduced fertility should widen income inequalities, the absolute levels of income in all income groups would be higher than in a situation of high fertility [26] Secondly, a more rapid growth of the total and *per capita* product under lower fertility does, in principle, open up better possibilities of redistribution of income through fiscal and other mechanisms

CONCLUSION

35. In this paper, an attempt has been made to consider systematically the impact of differential trends in fertility on net labour absorption and changes in the pattern of income distribution The method used has been to trace the impact of the major consequences of different rates of population growth on the dependent variables Although the paper is largely qualitative and conjectural, a number of important interactions and feedbacks have been left out of the analysis Precise results can only be obtained through the use of quantitative models However, the relationships between different variables are so complex and current knowledge of them so scanty that it is inevitable that simplified models which attempt to quantify these relationships will yield partial and even misleading results

36 A theme running through the paper is that reduced fertility can create the potential for greater net labour absorption and more favourable income distribution, yet, this potential can only be realized by *the pursuit of appropriate development strategies to* further these objectives In their absence, it is not at all clear that reduced fertility will make a decisive difference to income distribution and labour absorption. Indeed, as most historical studies indicate, the problems of poverty and unemployment might be intensified over long periods of time, as rapid growth associated with lower fertility proceeds from a low level of development.

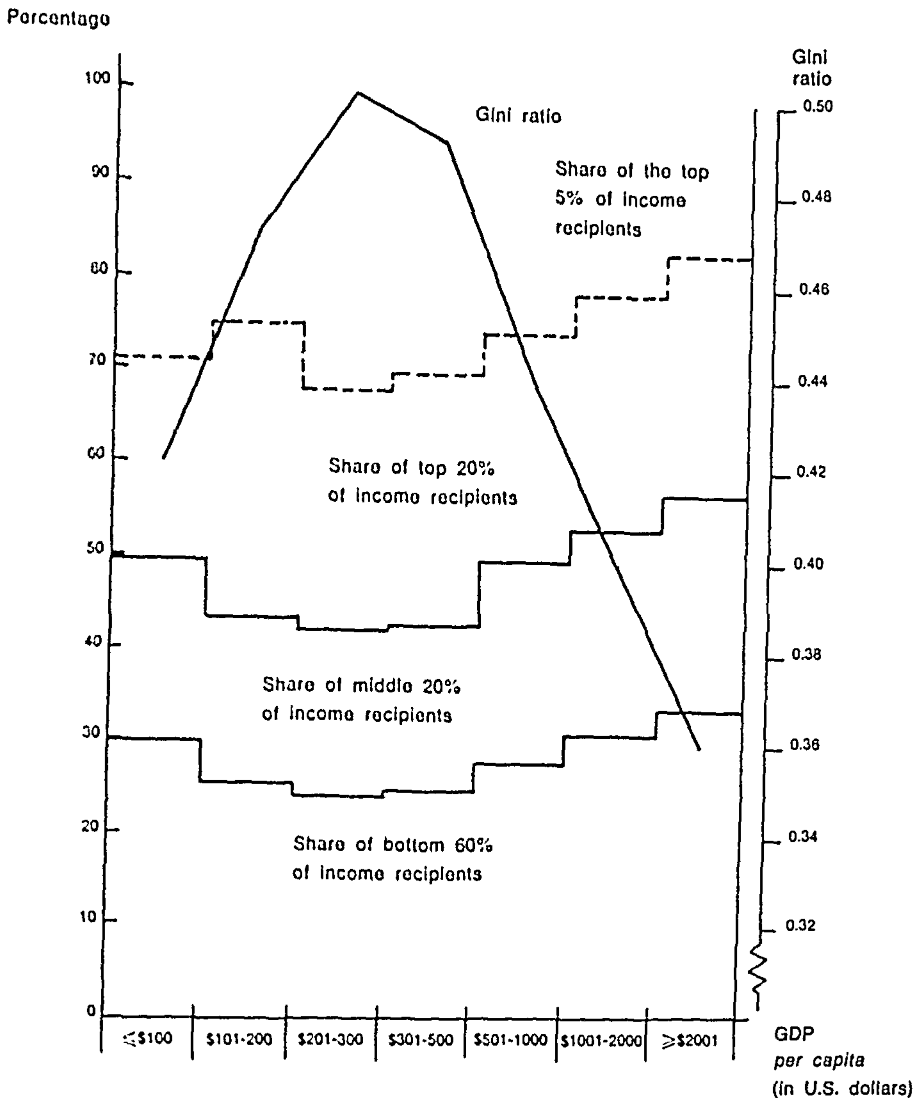
37 However, the longer the time horizon, the more favourable are likely to be the effects of reduced fertility on labour absorption and income distribution The longer the time considered, the more powerfully will the various consequences of reduced fertility operate in favour of employment expansion and improved income distribution In addition, over really long periods stretching from 50 to 150 years, there are enormous social costs of increasing density, not to mention the staggering effects of a population growing exponentially at the current rates on pollution, exhaustion of non-reproducible resources, food supplies and, ultimately, on the possibilities of economic growth itself [27]

[25] I. Adelman and C T. Morris, *op cit.*, identify the rate of improvement of human resources as the most important variable in patterns of income distribution in developing countries.

[26] One of the conclusions in the study by I Adelman and C T Morris, *op cit*, is that certain conditions in the early stages of the development process operate to worsen the relative and absolute positions of the poorest 40 per cent of the population.

[27] An exploration of these issues is to be found in D H Meadows and others, *The Limits to Growth. A Report for the Club of Rome's Project on the Predicament of Mankind* (London, Earth Island Ltd., 1972)

Distribution of income at different levels of economic development



SOURCE: F. Paukert, "Income distribution at different levels of development: a survey of evidence", *International Labour Review*, vol. CVIII, Nos. 2-3 (August-September 1973), p. 119.

creasing the concentration of assets is also likely to be stronger there.

29. The size distribution of income will also be affected by the differential rates of structural transformation associated with alternative rates of population growth. The impact on income distribution is, however, complicated, depending as it does upon the initial distribution of the labour force between agriculture and other sectors, the differences in sectoral *per capita* incomes and growth over time, and intrasectoral inequality of income distribution. [24] Under conditions typical of most African and Asian economies, where the preponderant part of the labour force is in agriculture, there are considerable and possibly increasing differentials between rural and urban *per capita* incomes, and intra-sectoral inequality either equal or possibly greater in the urban than in the rural sector, the structural changes in the economy associated with a slower rate of population growth almost always lead to a widening of income inequalities in the sense of a rapid decline in the share of the bottom 20-40 per cent of the population and an increase, or at best a slight decline, in the share of the top 5-10 per cent of the households.

30. The over-all capital intensity and the nature of technical progress affect income distribution by their impact on labour absorption. A high degree of capital intensity and labour-saving technical progress has adverse effects on labour absorption and, hence, on income distribution. More rapid capital accumulation under lower population growth is likely also to result

[24] S. Kuznets, "Economic growth and income inequality", *American Economic Review*, vol. XLV, No. 1 (March 1955), pp. 1-28.

in more "modern" techniques of production and, consequently, to widen inequalities by contributing to the growth of unemployment and underemployment.

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36. A theme running through the paper is that reduced fertility can create the potential for greater net labour absorption and more favourable income distribution, yet, this potential can only be realized by the pursuit of appropriate development strategies to further these objectives In their absence, it is not at all clear that reduced fertility will make a decisive difference to income distribution and labour absorption. Indeed, as most historical studies indicate, the problems of poverty and unemployment might be intensified over long periods of time, as rapid growth associated with lower fertility proceeds from a low level of development.

37. However, the longer the time horizon, the more favourable are likely to be the effects of reduced fertility on labour absorption and income distribution. The longer the time considered, the more powerfully will the various consequences of reduced fertility operate in favour of employment expansion and improved income distribution. In addition, over really long periods stretching from 50 to 150 years, there are enormous social costs of increasing density, not to mention the staggering effects of a population growing exponentially at the current rates on pollution, exhaustion of non-reproducible resources, food supplies and, ultimately on the possibilities of economic growth itself. [27]

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INCOME DISTRIBUTION AND POPULATION GROWTH *

H. W. Singer **

1. The question of income distribution, whether in relation to population growth or from some other aspect, can be considered at various levels. There is the international or global distribution of income, essentially the problem of the "gap" between the rich and poor countries; there is the question of income distribution within given developing countries. This, in turn, has many different aspects: regional distribution, urban/rural distribution, income distribution within the rural or urban sector, distribution between economic sectors such as agriculture, industry, mining etc.; distribution between the modern or "formal" sector and the non-modern or "informal" sector of the economy; distribution between factors of production, such as wages, self-employment, profits, rents etc. Each of these aspects can also be discussed and analysed in relation to population growth, either in the country as a whole, or in the population or labour force attached to the particular sector under discussion. This paper concentrates on income distribution between rich and poor groups within developing countries. But a few introductory remarks on the international distribution of incomes may not be out of place.

INTERNATIONAL INCOME DISTRIBUTION

2. As a purely statistical statement, it can be said that the widening gap between developed ("rich") and developing ("poor") countries is entirely, or almost entirely, due to the more rapid growth of population in the poorer countries. If the "gap" is defined as differences in *per capita* gross national product (GNP)—admittedly not the only and perhaps not the most important measure of the gap—the data indicate that the aggregate GNPs of rich and poor countries are increasing at very similar rates, especially if one concentrates on the Western countries as representing the "rich" group. But while aggregate GNPs increase fairly uniformly, both at a little over 5 per cent, [1] for each of the two groups taken as a whole, there is the striking difference that in the rich group over 75 per cent of the aggregate growth represents growth *per capita*, while only less than 25 per cent of the aggregate growth is absorbed in spreading the additional output over larger numbers. In sharp contrast, in the poorer developing countries, about half of the total increase in aggregate GNP is absorbed by larger numbers, leaving only one half or so of the total increase available for improving the *per capita* supply of goods and services. Thus, while growth in aggregate production is more or less the same, the rate of growth in production *per capita* in the developed countries is much faster than in the developing countries—a difference entirely due to the different rates of population growth.

3. This statement was described above as a "statistical statement"—and this qualification must now be emphasized. One could also add the word "static" to the description of this statement. It is not known whether, with a different rate of population increase in the poorer countries, say, one much lower and closer to the 0.6 or 0.7 per cent characteristic of the richer countries of Europe [2] in contrast to their current rate of 2.5 per cent or so, the aggregate increase in production would still be the same; nor even whether it would be lower or higher, if not the same. Hence, the foregoing statement tells nothing about the complex dynamic interrelationships between population growth and growth of production, and one must be careful not to draw unjustified conclusions from it. All the same, it is a *prima facie* important fact that differential population growth accounts for practically the entire growth in the relative gap between *per capita* incomes of developed and developing countries in the world today, even if it is a static and statistical statement. [3] The burden of proof to the contrary would seem to be on those who dispute the meaning of the statistical fact that differences in population growth are crucial.

4. There is still another relevant comparison between rich and poor countries that one might make. This relates to income distribution within the two groups of countries, rather than the gap in *per capita* income between them. As a general statement it seems well established that income distribution in poorer countries

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[1] In the case of market economies the figures are 5.1 per cent (developed) and 5.2 per cent (developing) for 1960-1970. *United Nations Yearbook of National Accounts Statistics 1971*, vol. III (United Nations publication, Sales No. E.73.XVII.3); see table 1, below, for more detailed breakdowns.

[2] *United Nations Demographic Yearbook 1971* (United Nations publication, Sales No. 72.XIII.1).

[3] The absolute gap will, of course, go on increasing, even in the absence of differential population growth.

TABLE 1. GROWTH OF GROSS NATIONAL PRODUCT AND GROSS NATIONAL PRODUCT *per capita* BY REGION

(Percentage per annum)

Area	*Period*	*Gross national product*	*Gross national product per capita*
World [a]	1960-1965	5.5	3.4
	1965-1970	5 4	3.3
	1960-1970	5 6	3.5
Centrally planned economies	1960-1965	5 9	4 8
	1965-1970	7 1	6 0
	1960-1970	6 7	5 6
Market economies	1960-1965	5 2	2.9
	1965-1970	4 8	2.6
	1960-1970	5 1	2.9
Developed market economies	1960-1965	5.3	4 0
	1965-1970	4 6	3 6
	1960-1970	5.1	4 0
Developing market economies	1960-1965	5 0	2.3
	1965-1970	5 8	3 1
	1960-1970	5.2	2.5
Africa [b]	1960-1965	4 4	1 8
	1965-1970	5 0	2.3
	1960-1970	4 7	2.1
North America	1960-1965	4 9	3.5
	1965-1970	3 4	2.3
	1960-1970	4 6	3.3
Caribbean area and Latin America	1960-1965	5 3	2.4
	1965-1970	5 8	2.6
	1960-1970	5 4	2.4
Asia and the Middle East	1960-1965	7 1	4.2
	1965-1970	7.5	4.5
	1960-1970	7 4	4 4
South-East and East Asia [c]	1960-1965	4 2	1 6
	1965-1970	5.5	2.8
	1960-1970	4 4	1.8
Europe . . .	1960-1965	5 0	3 8
	1965-1970	4 8	4.0
	1960-1970	4 7	3.8
Oceania . . .	1960-1965	5 1	2.9
	1965-1970	5 3	3.2
	1960-1970	5.1	2.9

SOURCE: *Yearbook of National Accounts Statistics 1971*, vol. III (United Nations publication, Sales No. E.73.XVII.3), international tables.

[a] Excluding China.

[b] Excluding South Africa.

[c] Excluding Japan.

tends to be less equal (more unequal) than in the richer countries. This is so whether one measures the distribution of incomes by some index based on the whole shape of the Lorenz curve, or whether one take more particular indicators such as the share of income going to the top 10 or 20 per cent of the population, or the ratio of incomes of the top 20 per cent to the bottom 20 per cent. There is perhaps one exception, i.e., in very poor countries the average is so low that the poorest 10 per cent or 20 per cent of the population may have—*indeed must have, in order to survive*—a higher ratio to the average than in richer countries. There are individual exceptions to the rule of greater inequality of income distribution in poorer countries; there are individual developing countries with a relatively equal income distribution, particularly in Asia; and there are one or two richer countries (for example France or the Federal Republic of Germany) with a more unequal income distribution than some of the more equal developing countries.[4] It is also of interest to note that those developing countries which

[4] See tables 2 and 3.

have a more equal income distribution tend to be countries that: (*a*) have a fairly high *per capita* income, bringing them into the "intermediate" group closer to the richer countries; (*b*) tend to have a high growth rate of GNP; and (*c*) tend to have a falling birth rate, after significant recent reductions, and a comparatively slow rate of population growth both in relation to the average of developing countries and also in relation to what one would expect in the light of the broad relationship connecting *per capita* incomes, on the one hand, and birth rates or rates of population growth, on the other.

Income distribution within developing countries

Population growth and lack of employment

5. If one is concerned with income distribution, because one considers reduction of poverty as the real purpose of development, attention is immediately riveted upon the question of employment. Poverty means a failure to attain a defined modest minimum income and the standards of food, clothing, shelter, access to water, social services etc. which go with this minimum income. The way to obtain these minimum

TABLE 2. INCOME DISTRIBUTION ESTIMATES: PERCENTAGE SHARES IN TOTAL NATIONAL INCOME GOING TO POPULATION GROUPS OF DIFFERENT INCOME LEVELS IN SELECTED COUNTRIES

Country	*Poorest 20%*	*Poorest 60%*	*Middle 40-60%*	*Highest 5%*	*Highest 20%*	*Population growth 1963-1971*
Argentina	7.00	30.40	13.10	29.40	52.00	1.5[a]
Bolivia	4.00	26.60	8.90	35.70	59.10	2.6[a]
Brazil	3.50	22.70	10.20	38.40	61.50	2.8[a]
Burma	10.00	36.00	13.00	28.21	48.50	?
Chad	12.00	35.00	12.00	23.00	43.00	2.3[a]
Chile	5.40	27.00	12.00	22.60	52.30	1.4
Colombia	2.21	15.88	8.97	40.36	68.06	3.2[a]
Costa Rica	6.00	25.40	12.10	35.00	60.00	3.2
Dahomey	8.00	30.00	12.00	32.00	50.00	2.5[a]
Ecuador	6.30	42.60	26.10	21.50	41.80	3.4[a]
El Salvador	5.50	23.60	11.30	33.00	61.40	?
Gabon	2.00	15.00	7.00	47.00	71.00	?
Greece	9.00	34.10	12.30	23.00	49.50	?
India	8.00	36.00	16.00	8.00	42.00	2.2[a]
Iraq	2.00	16.00	8.00	34.00	68.00	3.2[a]
Israel	6.80	38.80	18.60	11.20	39.40	3.0[a]
Ivory Coast	8.00	30.00	12.00	29.00	55.00	2.4[a]
Jamaica	2.20	19.00	10.80	31.20	61.50	1.4
Japan	4.70	31.10	15.80	14.80	46.00	1.1
Kenya	7.00	21.00	7.00	11.20	64.00	3.1[a]
Lebanon	3.00	23.00	15.80	34.00	61.00	2.9[a]
Libyan Arab Republic	0.11	1.78	1.28	46.40	89.50	3.7[a]
Malagasy	7.00	23.00	9.00	37.00	59.00	?
Mexico	3.66	21.75	11.25	28.52	58.04	3.2[a]
Morocco	7.10	22.20	7.70	20.60	65.40	?
Niger	12.00	35.00	12.00	23.00	42.00	2.7[a]
Nigeria	7.00	23.00	9.00	38.38	60.90	2.5[a]
Pakistan	6.50	33.00	15.50	20.00	45.00	2.1[a]
Panama	4.90	28.10	13.80	34.50	56.70	3.0[a]
Peru	4.04	17.10	8.30	48.30	67.60	3.1[a]
Philippines	4.30	24.70	12.00	27.50	55.80	3.0[a]
Southern Rhodesia	4.00	20.00	8.00	60.00	65.00	?
Senegal	3.00	20.00	10.00	36.00	64.00	2.4[a]
Sierra Leone	3.80	19.20	9.10	33.80	64.10	1.6[a]
South Africa	1.94	16.27	10.16	39.38	57.36	3.1[a]
Sri Lanka	4.45	27.47	13.81	18.38	52.31	2.2[a]
Sudan	5.60	29.30	14.30	17.10	48.10	2.8[a]
Surinam	10.70	37.00	14.74	15.40	42.40	?
United Republic of Tanzania	9.75	29.25	9.85	42.90	61.00	2.6[a]
Trinidad and Tobago	3.60	18.52	9.16	26.60	57.00	1.4[a]
Tunisia	4.97	20.57	9.95	22.44	65.00	?
Venezuela	4.40	30.00	16.60	23.20	47.10	?
Zambia	6.27	26.95	11.10	37.50	57.10	2.9[a]
Averages	5.6	26	12	30	56	

SOURCES: I. Adelman and C. T. Morris, "An anatomy of income distribution patterns in developing nations", *Development Digest*, vol. IX, No. 4 (October 1971); *Demographic Yearbook 1971* (United Nations publication, Sales No. E.72.XIII.1).

[a] Figures cannot be considered reliable.

TABLE 3. INCOME DISTRIBUTION IN SELECTED DEVELOPED MARKET ECONOMIES

(Percentage)

Country	Year	Quintile group 1st	2nd	3rd	4th	5th	Top 5 per cent	Population growth 1963 1971
United Kingdom	1964	5.1	10.2	16.6	23.9	44.2	19.2	0.4
Netherlands	1962	4.0	10.0	16.0	21.6	48.4	23.6	1.2
Sweden	1963	4.4	9.6	17.4	24.6	44.0	17.6	0.8
Federal Republic of Germany	1964	5.3	10.1	13.7	18.0	52.9	33.7	0.8
Denmark	1963	5.0	10.8	16.8	24.2	43.2	16.9	0.7
Norway	1963	4.5	12.1	18.5	24.4	40.5	15.4	0.8
France	1962	1.9	7.6	14.0	22.8	53.7	25.0	0.9
Finland	1962	2.4	8.7	15.4	24.2	49.3	21.0	0.4
Australia	1966-1967	7.4	11.7	17.4	22.8	40.7	16.2	1.9
United States of America	1967	5.0	12.4	17.8	21.3	43.5	17.8	1.1
Unweighted average		4.5	10.3	16.4	22.8	46.0	20.6	

SOURCES Economic and Scientific Research Foundation, *Trends in Income Distribution a Comparative Study* (New Delhi, 1970), *Demographic Yearbook 1971* (United Nations publication, Sales No E/F 72 XIII 1)

incomes, by and large, is through productive employment [5] Lack of productive employment is the major cause of poverty, i e, of failure to obtain the stipulated minimum income This is also the most useful definition of unemployment in the developing countries, where it does not, as is normally the case in the rich countries, take the form of measurable absence of a "job" Hence the question of income distribution largely overlaps with the question of more productive employment, or reduction of unemployment It is from this angle that one can obtain a rough first picture of the relation of rapid population growth and income distribution/employment.

6 To illustrate, a comparison may be made between Kenya and the United Kingdom of Great Britain and Northern Ireland Kenya has a rate of population growth—and, therefore, by and large, of the adult labour force—of 3.3 per cent per annum, [6] compared with 0 4 per cent in the United Kingdom. Hence, Kenya must find, per 1 million population, eight times as many additional productive employment opportunities as the United Kingdom in order to provide for its growing population But Kenya has available for this purpose only perhaps one fifteenth of the total resources (GNP) for each 1 million population as has the United Kingdom. Thus, while eight times as many jobs have to be provided per 1 million population, only one fifteenth of the resources are available to do so This means that for each job required, only one-hundred and twentieth, or less than 1 per cent, of the resources are available. Hence, if Kenya tried to provide the jobs required in such a way that the jobs would be of exactly the same kind as in the United Kingdom, only 1 per cent or less of the total needed number of additional jobs could be provided The remainder of the additional job-seekers would have to remain "unemployed", i e, poor In fact, of course, the distribution of jobs by sectors and types is different in Kenya, and the resources required per job are, in fact, lower All the same, the simple model discussed here shows that unless the technology, nature and distribution of jobs are very radically different, there are likely to be increasing unemployment among new job-seekers and increasing income inequality in Kenya, as a result of the more rapid population growth In fact, the technology used and other factors are not sufficiently different to make up for the 120 1 discrepancy Thus, this simple model may serve as a first explanation of the rising unemployment, especially among young job-seekers, and of the increased "dualism" and sharpening inequalities of income distribution in the developing countries

7 It is a matter of semantics whether, in the above-mentioned example, one says that the problem is due to the more rapid population increase in Kenya or to the absence of an appropriate technology It is the relationship between these two forces which matters, the larger the rate of population increase, the more a radically different technology is needed to provide productive employment and prevent increases in poverty With a given state of technology, rapid population increase clearly increases the danger of unemployment and rising poverty and inequalities

8 The simple model discussed here also helps to promote understanding of another part of the population story The more highly industrialized countries of today were never faced, at a comparable stage in their development (say, 80-150 years ago), with this kind of problem Their rate of population increase was lower, because of higher death rates and somewhat lower birth rates, and also because of the possibility

[5] Allowing, of course, for elderly persons, orphaned children, invalids and other groups for whom other means of providing the minimum income may be needed.

[6] International Labour Organisation, *Employment, Incomes and Equality, A Strategy for Increasing Productive Employment in Kenya* (Geneva, International Labour Office, 1972), p. 121.

of emigration. Above all, however, the urban and industrial technology was much more labour-intensive 80-150 years ago; there was no superior, "more modern" labour-saving technology available for import from elsewhere, from countries with entirely different requirements and resource endowments. Taken together, these factors meant that it was fairly easy for the currently developed countries to absorb the population increases in urban and industrial sectors; the number of people engaged in agriculture and in rural areas in general was first stabilized and then fell at a fairly early stage in development.

9. This rapid urbanization and industrialization in the structure of employment was clearly related to the fall in birth rates. From all that is known, falling birth rates are associated with urbanization and industrialization; the desire for smaller families is clearly more prevalent, and the diffusion of family planning practices more rapid, among urban population and especially among those associated with modern industrial activities. [7] But in most of the currently developing countries, the absolute numbers engaged in agriculture and living in rural areas will still have to increase for decades to come, while the percentage of the population engaged in modern industrial occupations is not rising as rapidly as it did in the developed countries of today. Here, again, one sees that the same configuration of more rapid population increase and a too capital-intensive technology creates both a dualistic and an unequal economic structure with a limited high-income sector, and a situation in which the fall in birth rates will be difficult and retarded in the absence of specific income and employment policies, and, perhaps, family planning policies.

The traditional model no longer applicable

10. The traditional development model is no longer applicable for reasons implicit in what has already been said. According to this model, [8] the rural surplus population would be steadily absorbed into the industrial sector, while its existence will keep real wages in the industrial sector down, so as to produce reasonable equality between rural and urban incomes (although possibly greater inequality between capitalists and workers within the urban sector); with the prospect of a "golden age" when the rural surplus population will be exhausted, and both rural and urban incomes will rise together. Then income distribution will become more equal as a result of the strengthened position of labour, a weakening position of capitalists due to an abundance of capital and the spreading of a "welfare state" situation. Such a situation would also be clearly favourable to a reduction in birth rates; the improved level of living would, by all available evidence, [9] reduce birth rates; and the increased social security would make children unnecessary as a means to security in old age; while, at the same time, children would, as a result of higher incomes, also become unnecessary as earning assets and, instead, turn into increasing economic liabilities as a result of parents' rising levels and duration of maintenance and education for their children.

11. Paradoxically, this model applies to the developed countries of today much more than the developing countries for which it was designed. In the developing countries, one faces a different reality, based on the relationship of population increase to the nature of technology already described. Even though the towns may be increasing rapidly in absolute size and new elements of urban squalor and poverty, with their own tendencies to high birth rates, spread; yet, at the same time, there will be an increase in rural population deprived of the capital resources necessary for effective rural development, and an increase in income inequality due to the privileged position of owners of capital and land and all those associated with the limited modern sector. The bulk of the population will not be entering that golden age of increased material and social benefits, and the expectation of a continuing improvement in such benefits, which would create a situation in which the desire for smaller families takes hold and family programmes become effective.

12. The traditional (Arthur Lewis) model is not so much wrong, but it omits to state that it will only come about as a result of development strategies that benefit the agricultural population through effective agricultural and rural development, increase the employment-absorption capacity of the economy, and create "welfare state" conditions of rising material and social benefits for the bulk of the population, which the model erroneously assumes to come about in the natural course of events.

A "generation gap" in income distribution

13. Another somewhat neglected relationship between income distribution and population growth, which deserves to be emphasized, is discussed below. Where birth rates are high and population growth rapid, a high proportion of the population consists of children. Typically, in many countries, over 40 per cent of the population may be under 15 years of age, compared with perhaps 20-25 per cent in the richer countries. This situation has been noted so far mainly because it results in a high dependency ratio, each producer having more dependents, thus lowering *per capita*

[7] This association is largely explicable in terms of higher incomes and better health and education facilities in the urban industrial centres. See Richard Nelson, *Structural Change in a Developing Economy: Colombia's Problems and Prospects* (Princeton, New Jersey, Princeton University Press, 1971), p. 22.

[8] Especially associated with W. A. Lewis, "Economic development with unlimited supplies of labour", *The Manchester School of Economic and Social Studies*, vol. 22 (1954), pp. 105-138.

[9] See, for example, W. Rich, *Smaller Families Through Social and Economic Progress*, Overseas Development Council, Monograph series (Washington, D.C., 1973).

incomes.[10] What it also means, however, is that there is one half of the population—children and very young people—almost automatically lives at a much lower average level of living. Where birth rates are high, the great majority of children are almost, by definition, members of large families. The *per capita* incomes of those living in large families are lower than those in small families, even if the birth rate is the same for different income groups If the birth rate is higher for the poorer income groups, as is almost invariably the case, the income gap between large and small families is further widened

14. It is a fairly safe assumption that, if the average *per capita* income in a developing country is, say, $200 per annum and the birth rate is correspondingly high, the average *per capita* income of children—heavily weighted towards large families—will be little more than half the national average, i e., $100. This aspect of the "generation gap"[11] is particularly harmful from a development point of view. The children, with their full productive life before them, need the "human investment" provided by a minimum income more than do the adults, but they get less There is accumulating evidence that the poverty and attendant malnutrition of children result in mental, as well as physical, damage, thus reducing the effectiveness of future investments in education, equipment for producers etc and in this way perpetuating the cycle of poverty and inequality

15. Here is a clear demonstration of one of the many vicious circles at work. a high birth rate produces a high proportion of children and, through the generation gap, income inequalities which tend to perpetuate themselves; at the same time, income inequalities, through their effect on the birth rate in general, and through the additional effect of differentially high birth rates among the poorer population, create new inequalities between the generations, laying a foundation for a new cycle of subsequent income inequalities. It is clear that deliberate government policies to shift income to families with children (without creating incentives for more children), and/or to reduce the *proportion of children in the population and the proportion* of children within large families, are required to break these vicious circles

A model of interrelationship between income distribution and population, with policy suggestions

16 A model of interrelationship with population growth in which income distribution and the associated employment factor emerge in a crucial role is as follows: the desire for smaller families and the capacity to translate this desire into action are a function of a minimum level of income, and of those minimum levels of security and expectation of future progress and minimum levels of education, literacy, health, nutrition etc. which are associated with such reasonable minimum levels of income The bulk of the population in developing countries reaches such minimum levels only if the scarce resources of the country, and the scanty increments arising from their growth, are widely distributed to the great bulk of the population, in other words, only if incomes are either fairly equally distributed in the first place, or else are heavily redistributed in the direction of greater equality An initial reasonably equal income distribution can be obtained from an appropriate economic structure with emphasis on small farming, small business, use of labour-intensive technologies, public services benefiting the masses of the population, rural development and a dispersed type of development widely spread over the different regions of the country etc A reasonably equal income distribution through redistribution can be obtained through appropriate incomes policies, tax policies and appropriate redirection of government expenditure It is when such conditions are present that the bulk of the population will be willing and able to limit families, and the vicious circle of rapid population increase and poverty can be broken and converted into a cumulative process of improvement

17 This theory has been most clearly described and supported by William Rich[12] who calls it the "Development-Fertility Continuum" This view seems consistent both with empirical data (although the possibility of testing it is limited by the general paucity of data relating to income distribution) and, in general, with the results of simulation models (though again such models usually do not incorporate income distribution as a specific variable) It has already been mentioned that the developing countries with lower birth and death rates tend to be countries with relatively equal income distribution (for example, Barbados, Chile, Cuba, Republic of Korea, Sri Lanka and Uruguay) In developed countries, of course, the necessary minimum level can be attained by the bulk of the population, regardless of income distribution This would seem to rule out income distribution as such as an important factor in this situation, and it also appears to be consistent with empirical evidence

18 This view of the matter suggests a policy of giving priority to moving the bulk of the population to the threshold level where smaller families are desired and practicable, i e , a policy of reducing the incidence of poverty as quickly and widely as possible As it happens, this goal is also increasingly proposed and accepted as the real purpose of development, and an objective that is not only politically preferable to an abstract objective such as maintaining the growth rate of GNP, but that will, in effect (and perhaps paradoxi-

[10] Although, as previously stated, this particular effect may be partially offset by a tendency for young children in poor countries to be economic producers at an early age, especially in rural areas. This offset, however, involves, in turn, a lack of education and perpetuation of the poverty syndrome

[11] For further discussion of this subject, see H W. Singer, *Children in the Strategy of Development*, Executive briefing paper No 6 (New York, United Nations Centre for Economic and Social Information and United Nations Children's Fund, 1972).

[12] W Rich, *op cit*

cally), also contribute more effectively to the growth of GNP. The three pilot International Labour Organisation (ILO) employment missions to Latin America, Asia and Africa,[13] undertaken by the ILO as executing agency for the United Nations Development Programme (UNDP), may be cited as indicative of this new approach, and also the series of recent speeches by Robert McNamara, the President of the International Bank for Reconstruction and Development (IBRD).

19. If one can now add to the other conclusive arguments in favour of such a policy an effect in reducing birth rates and thus releasing the upward cumulative movements flowing from such an effect on birth rates, the case for such a reorientation of development policies would become even more overwhelming, and income distribution moves into the centre of the development picture.

20. The most immediate impact of a reduction in poverty and the raising of the incomes of the bulk of the population towards a reasonable minimum (reasonable in relation to the resources of the country) would probably be on mortality rates rather than birth rates. A better income means better nutrition, better health, better education etc.; and a reduction in death rates is almost certain to be a result of such a syndrome of improvement. Superficially, it might be thought that the reduction in mortality would go against the trend of the preceding argument, since it would mean an increase, rather than a decrease, in the rate of population increase. But this view would be superficial for two reasons:

(1) An increase in population due to a fall in death rates has a quite different (more favourable) developmental impact than an increase in population growth due to rising birth rates. In the former case, the dependency ratio is improved (unless, of course, the reduction in mortality is very heavily concentrated on infantile mortality only). Premature death is an economic waste of resources. Moreover, its prevention (like the reduction in poverty) is, in any case, itself one of the fundamental development objectives;

(2) A second and more direct reason is that the reduction in mortality rates is a factor which may be either necessary or at least important in helping to create a desire for fewer births. The desire for large families derives much of its force from the desire to have a number of children surviving for support in old age. If there is high mortality it can easily be seen that a desire to have two sons surviving into one's own old age requires from eight to ten births in the family; with reduced mortality, this figure will come down to four or five. A model explaining the course of birth rates as partly a lagged consequence of the course of mortality rates has been developed and applied to Colombia and Puerto Rico with a great deal of explanatory validity.[14]

21. The time lag between falling death rates and falling birth rates will, of course, give rise to a transitional period, during which population growth will be rapid. But the harmful effect of this growth would normally be offset by the economically beneficial effects of lower death rates in reducing the waste of loss of human investment in feeding, educating, training and equipping people who die before they have made their full productive contribution. What is beneficial for development is not only a low birth rate or a low rate of population increase, but a combination of low birth rates and low death rates, which has been achieved in the developed countries. In primitive communities, the rate of population increase may also be very low; but in their case, this increase is the result of an economically wasteful combination of high birth rates being offset by high death rates. Hence, if the reduced mortality is a necessary first step towards achieving the more desirable low birth rate/low death rate type of equilibrium, it is a step in the right direction.[15] If more equal income distribution leads to lower mortality rates, as well as lower birth rates, this is not in any real sense an ambivalent or contradictory development.

22. This view of the development—fertility continuum is compatible with various threshold constraints. The nature of the curve that links incomes and income security, on the one hand, and birth rates, on the other, may well not be a straight line. It may well be that in the developing countries, and particularly in the least developed among them, the level of income needed for an effective fall in birth rates is higher than can be achieved with current resources. Where this is the case, it could again be superficially argued that if there is such a threshold effect, a policy of income distribution and employment creation should concentrate on the somewhat higher income groups close to the threshold level rather than on the poorest groups further distant from it. Except as a very short-run policy, however, this would be short-sighted. Obviously, to raise incomes to the threshold level can only be a gradual and continuous process. Just as a reduction in mortality rates (apart from being desirable in itself) may be a necessary first step towards reducing birth rates, so to move the poorest population groups within closer striking distance from the threshold level, even if they cannot yet cross it, may be a necessary step in order to enable them to cross the threshold level at a

[13] International Labour Organisation, *Towards Full Employment: a Programme for Colombia* (Geneva, International Labour Office, 1970); International Labour Organisation, *Matchi g Employment Opportunities and Expectations: a Programme of Action for Ceylon*, 2 vols. (Geneva, International Labour Office, 1971); *Employment, Incomes and Equality . . . , op. cit.* The author acted as a consultant to the ILO in developing its World Employment Programme and led the mission to Kenya.

[14] See Richard Nelson, *op. cit.*

[15] It may be added that if the fall in death rates is a necessary condition for the fall in birth rates, then the sooner it happens, the better, for the smaller the size of population when "equilibrium growth" is achieved. This certainly, however, point up the need to emphasize population policies and family planning to contain or offset the increase in population during the transitional period.

later date (again apart from being a desirable policy on other grounds).

The income distribution/birth rate syndrome

23. Among the problems of quantification already mentioned is the limited range of data on income distribution and on the extent of poverty, resulting from the concentration, until now, on growth rates of GNP and on such components of the classical growth model as savings, investment, capital/output ratios etc It is to be hoped that this gap in current knowledge will be gradually filled, as attention becomes focused on more meaningful measures of development. There is, however, another difficulty in quantification and information-gathering, which arises from the fact that the relationship between income distribution and birth rates is characterized by multiple and complex interlocking circular relationships with mutual cumulative feedbacks and difficulties of disentangling causes and effects. This is best expressed by saying that the dimensions of poverty form a syndrome, from which individual factors can only be disentangled at the risk of gross over-simplification

24. Poverty, as a result of inequality of income distribution, has a number of dimensions: lack of food, clothing, shelter, education and training opportunities, lack of access to social services, government services and information of all kinds, lack of hope and purpose in planning for the future, lack of willingness or ability to take the risks involved in new initiatives; lack of security. All these deficiencies form major aspects of poverty and all have direct feedback effects on birth rates: poor health and poor nutrition increase mortality rates and thus increase the birth rate required to achieve given survival rates, lack of literacy or access to government health services makes it more difficult to understand and obtain family planning services; risk-aversion makes poor people that much more reluctant to change any of their traditional habits and patterns; improved access to social amenities such as electricity, educational facilities and entertainments is known to lower the birth rate.[16] Moreover, these various aspects of poverty are *also mutually reinforcing; lack of education and literacy* worsens nutrition and health; lack of health worsens nutrition by making it more difficult to absorb calories, proteins and vitamins, poor housing or lack of access to piped water endangers health etc. Thus, not only is there a reinforcing cumulative relationship between poverty and high birth rates, but there is also a similar reinforcing cumulative relationship among the various dimensions of poverty

25. This complex situation, while not conducive to the development of numerical and quantitative analysis and verification, does, on the other hand, establish a particularly strong case for action. If improvement in any of these factors is likely to lead to cumulative improvement in other factors and is likely through reduced birth rates to result in further reductions of poverty, beginning a new cycle of improvement, it is obvious that the benefits of any initial improvement are much greater than a direct and static cost/benefit analysis is likely to show. No doubt, much more sophisticated techniques of cost/benefit analysis, including all the indirect effects and feedbacks, can be notionally developed, but this does not resolve the underlying difficulty of finding the data for such a sophisticated analysis and defining the nature of the mutual relationships involved. It is for this reason that in the past, simulation models and factor analysis, rather than cost/benefit analysis, have been applied. Another consequence is that as long as allocations of expenditures, whether by national Governments or aid donors or international organizations, are based on the project approach and related types of cost/benefit analysis, investment will be biased against the kind of project that would break into the vicious circle between poverty and high birth rates Heroic attempts have been made to calculate the cost/benefit ratio of family planning programmes and projects,[17] usually with very favourable results But little attempt has been made from the other end, i e, to include in the cost/benefit analysis for projects designed to attack poverty, the benefits arising from the relationship with lower birth rates.

[16] *In Puerto Rico and elsewhere, rural electrification has* been observed to diminish the birth rate as village after village was reached The same is certainly true of water supplies; as irrigation reaches villages and levels of living rise, the birth rate will tend to decline as a result of higher levels of living and new aspirations. Often, of course, the effect of such individual factors as electricity or irrigation may be difficult to isolate.

[17] See Steven Enke, "Economic consequences of rapid population growth", *Economic Journal*, vol 81, No 324 (December 1971), pp 800-811 For an abstract country called "Developa", Enke estimates the benefit/cost ratio of reducing the gross reproduction rate by about 50 per cent in 25 years. Such a reduction, he says, should lead to economic benefits (in terms of income *per capita*) from 50 to 150 times greater than the costs, over a 35-year period Enke's calculations have, however, been criticized.

L'ÉCONOMIE DES MIGRATIONS INTERNATIONALES DE TRAVAILLEURS

Georges P. Tapinos *

Position du problème

1. La migration fait partie des phénomènes à évolution lente qui transforment profondément et imperceptiblement une société, et dont l'on ne prend conscience qu'à l'occasion d'un fait révélateur souvent éphémère. Le phénomène est ancien, et sans remonter au-delà des temps modernes, la migration internationale apparaît comme l'une des empreintes indélébiles de l'histoire des nations. Qu'il suffise de rappeler que de la deuxième moitié du XIX[e] siècle à la guerre de 1914, environ 40 millions d'Européens ont franchi les océans à destination principalement des Amériques [1]. La crise de 1929 a été l'occasion et le prétexte d'une modification des données du problème. Le mouvement qui s'était ralenti, sans pour autant se tarir, prend, vers la fin des années 1930, une direction nouvelle. Cette "réorientation" du courant migratoire séculaire [2] a touché pratiquement tous les pays traditionnels d'émigration, et s'est opérée dans une période de temps relativement courte et parfaitement située [3]. De plus, elle est allée de pair avec un élargissement à des pays jusque-là peu concernés et s'est accompagnée d'une transformation profonde de la nature du problème, ainsi qu'en témoigne le développement d'une immigration étrangère dans des pays qui restent principalement des pays d'émigration [4]. Tout cela suggère, au-delà des spécificités nationales, l'existence de facteurs explicatifs généraux.

2. En dépit de l'importance de la migration internationale, on ne peut pas dire que les démographes et les économistes y aient prêté beaucoup d'attention. Il n'y a jamais eu de théorie des migrations et les migrations n'ont jamais (ou presque) été prises en compte dans l'élaboration des théories économiques. A cela, il y a d'abord une raison empirique: la migration a été considérée, *a priori*, comme un bienfait, aussi bien pour les pays émetteurs [5] (avec une arrière-pensée malthusienne), que pour les pays récepteurs (avec une arrière-pensée mercantiliste). Ce qui, dans un cas comme dans l'autre, dispensait d'une analyse du phénomène. De la même façon, le regain d'intérêt pour l'étude des migrations découle des inquiétudes issues de la difficulté d'en mesurer les implications pour les pays concernés.

La lacune économique

3. Dans la démarche déductive, voie royale de l'analyse économique, les hypothèses de départ ont une importance considérable; par un rare cumul de circonstances, le phénomène des migrations a toujours été rejeté en dehors du champ central de l'analyse. Soit la théorie de l'échange international des classiques. Généralisant une observation d'Adam Smith, selon laquelle de toutes les marchandises, l'homme est la moins mobile entre les pays, les classiques ont construit une théorie de l'échange international fondée sur l'hypothèse centrale d'immobilité des facteurs de production : capital et travail. Lorsque plus tard, la démonstration fut faite selon laquelle sous certaines hypothèses, et en particulier l'immobilité du travail, le libre-échange tendait à l'égalisation internationale du prix des facteurs, le problème de la migration internationale pouvait être rangé au nombre des faux problèmes dont la théorie de l'échange international n'a pas à se soucier. L'hypothèse fondamentale de l'univers néo-classique est la rareté de facteurs de production homogènes. C'est la rareté qui, dans un monde rationnel, garantit l'allocation optimale des ressources et l'égalisation du coût marginal à la recette marginale. C'est l'homogénéité qui autorise la formalisation des fonctions de production. Par contraste, et sur ce point en conformité avec les hypothèses classiques, la migration internationale naît d'une situation d'offre illimitée de travail différencié. Reste l'analyse keynésienne et post-keynésienne. En caractérisant sommairement l'approche keynésienne comme un modèle global d'économie de sous-emploi en économie fermée, on identifie très exactement trois des "contre-hypothèses" qu'il convient

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[1] W. F. Willcox, *International Migrations*, New York, National Bureau of Economic Research, 1929-1931, vol. I et II.

[2] A. Sauvy et Moindret, "Le renversement du courant migratoire circulaire", *Population*, janvier-mars 1962. On doit à MM. Sauvy et Moindret la première observation et la dénomination du phénomène. Nous préférons éviter le terme de "renversement" pour deux raisons. D'une part, il ne s'agit pas d'une inversion des courants, d'autre part, la migration à destination des pays industrialisés n'a pas supprimé l'émigration traditionnelle d'outre-mer.

[3] C'est en effet dans les dernières années de la décennie 1950-1960 que le phénomène s'observe aussi bien en Italie (1957), en Grèce (1959-1960), au Portugal (1960), en Espagne (1964), etc.

[4] Italie, Espagne (immigrants portugais), Grèce (immigrants d'Afrique du Nord), etc.

[5] Précisons une fois pour toutes que les termes de "pays d'émigration", "d'origine", "émetteur", "de départ" et leurs correspondants : immigration de destination, récepteur, d'arrivée) seront utilisés indifféremment.

de faire au départ pour analyser les migrations. phénomène sectoriel et catégoriel d'économies de suremploi. D'une façon générale, l'absence d'analyse originale du marché du travail chez Keynes, avec toutes les implications qui en ont résulté quant aux modèles de croissance post-keynésiens, où l'effort de réflexion porte sur la demande et l'accent est mis sur l'investissement, n'était pas de nature à faire progresser la connaissance d'un phénomène de migration internationale de main-d'œuvre.

La lacune démographique

4. L'analyse démographique reste marquée par ses origines statistiques. Depuis Graunt, Petty ou Sussmilch, la démographie est une arithmétique politique, une science tributaire de l'observation. Cette soumission aux données d'expérience a eu pour effet de privilégier l'étude des phénomènes bien observés et de suspecter l'exploration théorique déductive. Parallèlement, tous les phénomènes, où, par accident historique ou implication logique, l'observation statistique fait défaut et les méthodes de reconstitution *ex post*, impossibles, ont été ignorés par l'analyse démographique. La migration, et tout particulièrement la migration internationale, est le lot de ces questions ignorées. Cela est d'autant plus étonnant qu'elle constitue l'une des causes majeures de modification des effectifs et des structures des populations Si les lacunes commencent à être comblées pour ce qui concerne les migrations internes, il n'en vas pas de même pour les migrations internationales Les rares tentatives d'approche déductive ont fait long feu [6].

5. Face à ce vide théorique et sous la pression des faits s'est développée dans le passé une analyse autonome de la migration qui prend appui sur le modèle transocéanique. Les caractéristiques de cette grande migration sont bien connues. L'analyse du processus soulève diverses questions qui présentent un grand intérêt pour les migrations actuelles. Entre les facteurs d'appel et les facteurs de répulsion, quelle est la force déterminante ? Parmi ces facteurs, les occasions d'emploi jouent-elles un rôle plus (ou moins) important que les écarts de rémunération ? Faut-il introduire des décalages chronologiques pour améliorer l'ajustement ? Plus généralement faut-il envisager une interdépendance générale des pays concernés, au sein d'une "économie atlantique intégrée" ? C'est la thèse de Brinley Thomas [7], qui constitue, en vérité, la spécification la plus ambitieuse d'un modèle de migration, propre aux migrations transocéaniques. B. Thomas a montré, au-delà des découpages nationaux, l'existence d'une véritable économie atlantique intégrée. Dans cette perspective, il apparaît alors qu'au lieu de converger d'un pays à l'autre, les cycles enregistrent une évolution divergente dans chacun des pays considérés. On observe en effet. *a*) un parallélisme des mouvements d'hommes, de capitaux et de marchandises; *b*) la substituabilité des migrations internes et externes; *c*) une divergence dans les mouvements cycliques du pays *A* et du pays *B*. Les critiques n'ont pas manqué Elles dépassent parfois les simples spécifications et remettent en cause le modèle dans son ensemble [8] Elles amènent à conclure que la nature des relations dégagées par Thomas n'est pas aussi univoque qu'on le croyait, sans nier pour autant l'insertion de la migration dans une économie transocéanique intégrée.

Caractère de la migration

6 La migration actuelle prolonge les courants traditionnels et apparaît tout à la fois comme un phénomène nouveau. C'est d'abord un phénomène non marginal La migration ne peut plus être implicitement reléguée dans la clause *caeteris paribus* Comment expliquer, par exemple, la croissance des économies occidentales au cours des deux dernières décennies sans intégrer l'immigration ? C'est un phénomène durable Les références seraient innombrables à l'appui de la thèse, largement admise, à l'origine du développement des migrations en Europe, que celles-ci ne constituaient qu'une réponse transitoire à une situation transitoire de suremploi sectoriel. Quelles que soient les fluctuations d'une année à l'autre, la tendance et les effectifs ne laissent aucun doute à cet égard L'immigration est devenue une caractéristique structurelle de la croissance des pays récepteurs et émetteurs C'est enfin et surtout un phénomène nouveau Il y a certes entre toutes les migrations, externes ou internes, transocéaniques ou intra-européennes, économiques ou politiques, des points communs. Cependant, en voulant considérer les migrations sous leur angle le plus général, on s'expose à ignorer les hypothèses spécifiques de chaque type de migration qui déterminent la plupart des relations explicatives du phénomène.

7. En l'absence d'une théorie générale des migrations internationales, le problème n'a été appréhendé jusqu'ici qu'au travers d'éclairages partiels Les résultats sont contradictoires et les divergences l'emportent sur les points d'accord. Il n'est guère de question où les thèses les plus opposées n'aient été avancées, qu'il s'agisse par exemple des implications de l'immigration sur les taux de salaires, la productivité, le chômage, l'inflation, la balance des paiements, le développement des pays d'origine, etc. La complexité du phénomène et l'absence de réflexion théorique ne sont pas sans expliquer ces hésitations. Cependant, il convient de prendre la mesure vraie de ces contradictions. Nombre d'entre elles proviennent d'une dissociation de l'analyse des hypothèses spécifiques à chaque type de migration, et en particulier de la transposition de résultats établis pour un type historique donné à une autre forme de migration. La difficulté majeure résulte de ce que la

[6] Mentionnons la thèse de F Walker sur la relation immigration/fécondité et la théorie de l'optimum du peuplement

[7] B Thomas, *Migration and Economic Growth*, Cambridge, Cambridge University Press, 1954

[8] R A. Easterlin, « Infl World War One », *F Change* (Chicago), 1961,

migration affecte l'ensemble des variables et relations du système économique.

Les déterminants de l'offre et de la demande de travail étranger

8. La condition nécessaire et suffisante pour que la migration ait lieu est évidemment : *a*) qu'il existe "quelque part" une capacité de main-d'œuvre "disponible"; *b*) que l'entreprise "ait besoin" de cette main-d'œuvre; *c*) que cette main-d'œuvre "soit disposée" à se déplacer vers les lieux de production. La condition nécessaire, mais non suffisante à toute émigration, est que les préalables *a*) et *c*) soient remplis. L'examen de ces conditions fait l'objet d'un premier paragraphe où l'on s'efforce de donner un cadre analytique à la décision d'émigrer, replacée dans une théorie générale des migrations. Le paragraphe suivant analyse les raisons et les conditions du recours à cette main-d'œuvre immigrée et s'attache à montrer le caractère asymétrique du phénomène et l'impact déterminant de la demande de travail dans la détermination de l'équilibre de l'emploi.

Nature de l'émigration

9. La migration internationale de travail s'analyse en un déplacement géographique associé au choix d'une profession. La décision d'émigrer présente, par rapport aux modèles du choix de la profession, trois caractères spécifiques. D'une part, le choix de la profession est largement déterminé par l'histoire de l'individu, antérieurement à son accession à l'âge d'activité ; le milieu social et l'éducation reçue (elle-même liée au milieu social), conditionnent les choix. La migration, en revanche, permet directement (par établissement définitif dans le pays d'émigration) ou indirectement (au retour après la migration) un saut qualitatif sans aucune mesure avec le taux "normal" de mobilité sociale à l'intérieur d'un pays.

10. D'autre part, il y a une différence de nature entre les deux types de décision. Le problème posé par le choix de la profession n'est pas véritablement celui d'une alternative entre travailler ou ne pas travailler, mais celui du type d'emploi vers lequel se diriger. En d'autres termes, la décision d'émigrer est à la fois plus fondamentale et d'une certaine façon moins complexe. A priori, toutes choses égales par ailleurs, l'émigration n'est jamais une nécessité qui devra être accomplie à un moment donné du cycle de vie. Inversement, le choix d'une profession est inéluctable, à quelques exceptions près. La décision ne porte que sur le choix de la profession.

11. Enfin, davantage que le choix de la profession, l'émigration engage l'avenir. Une fois prise la décision d'émigrer, l'éventail des choix ultérieurs se resserre considérablement. La décision d'émigrer n'est pas réductible à une simple décision de partir. Elle enferme implicitement toute une séquence de choix qu'il est difficile de modifier au cours du processus de la migration. Le candidat au départ, qui émigre effectivement, s'engage : *a*) à quitter temporairement son pays ; *b*) à exercer une activité professionnelle donnée ; *c*) à réussir sa migration, c'est-à-dire à accumuler le maximum d'épargne dans le minimum de temps. La prise de conscience du caractère séquentiel de la migration est d'une importance considérable. Elle permet une interprétation pertinente des déterminants de la décision d'émigrer, et souligne les enchaînements inéluctables, une fois la décision prise.

12. L'émigration traduit en général une rupture dans un équilibre ancien. Souvent l'émergence d'un courant migratoire ou la réorientation d'un courant ancien coïncident avec une modification structurelle, parfois d'origine institutionnelle. Cette rupture d'équilibre n'est pas nécessairement un phénomène observable. Il peut s'agir en effet d'une appréciation subjective du migrant, confrontant les anticipations qu'il fait sur sa condition et sur l'évolution du milieu environnant. Le développement exogène du système d'enseignement a également pour effet de permettre une diffusion plus grande de l'information et d'élargir le décalage entre les aspirations individuelles et la capacité d'absorption du système économique. Enfin, les débuts de l'émigration coïncident souvent avec l'amorce du développement économique. Le démarrage de la croissance introduit en effet une instabilité de l'emploi, assure une plus grande diffusion de l'information et contribue à la modification des systèmes de préférence des travailleurs.

13. S'agissant des caractères démographiques, l'émigration est très sélective d'après les âges, et pour deux raisons au moins. D'une part parce que les pays récepteurs imposent des critères d'âge dans la sélection des immigrants, d'autre part parce que la force d'inertie est fonction directe de l'âge. Il en va de même quant à la répartition par sexe. Notons cependant que la part des femmes dans la migration s'accroît très sensiblement, par suite du regroupement familial et, ce qui est relativement nouveau, du développement de l'émigration féminine active [9]. Pour ce qui concerne la situation de famille, en revanche, les observations sont contradictoires et les raisons ne manquent pas à l'appui d'une propension à émigrer plus forte parmi les célibataires ou inversement parmi les hommes mariés. Au-delà de ce premier niveau superficiel, notre ignorance est grande. Existe-il une relation positive entre l'émigration et la taille des familles ? Dans quel sens agissent les événements personnels comme la perspective d'un mariage ou d'une naissance ?

Esquisse d'une théorie des migrations

14. L'obstacle fondamental auquel se heurte toute construction théorique en ce domaine est ce que l'on pourrait appeler le postulat d'inertie : toutes choses égales par ailleurs, les individus expriment une préférence pour l'immobilité. Il appartient donc à la théorie d'expliquer pourquoi à un moment donné, cette loi

[9] G. Tapinos, « L'immigration étrangère en France 1946-1972 », *Cahier*, Institut national d'études démographiques (Paris), 1974.

ne s'applique plus. Cela suppose que les freins à l'émigration aient disparu ou se soient atténués et que les changements intervenus soient suffisamment puissants pour susciter un flux de départs. Cette observation d'ordre général recouvre deux concepts analytiques. D'une part, pour reprendre une distinction de Katona, l'émigration n'est pas le fait de la simple routine et suppose une décision véritable ; d'autre part, un certain seuil [10] doit être franchi pour que l'émigration devienne effective.

15. Considérons un espace géographique donné, dans une société traditionnelle, économiquement peu développée. Tous les freins concevables agissent pleinement pour rendre l'émigration extérieure peu probable : l'information sur le monde extérieur est limitée, voire inexistante, les coûts du déplacement très élevés, l'incertitude considérable, l'attachement aux valeurs culturelles très fort. L'idée qu'il existe une possibilité de modification des conditions de vie est absente de l'univers mental de l'individu. Dans cet univers incertain, quels que soient le déséquilibre entre les besoins et les ressources, la pression démographique et le retard économique, une seule possibilité s'offre à l'individu : rester. Les déterminants de l'émigration sont alors davantage psychologiques et liés à la personnalité des individus : émigreront quelques esprits aventureux, en toute hypothèse peu nombreux.

16. L'apparition d'une véritable émigration est conditionnée par le desserrement des freins au départ information renvoyée par les premiers individus qui ont émigré, diminution des coûts de transport, atténuation des obstacles juridiques, incertitude balancée par les espérances d'amélioration du niveau de vie, etc. La possibilité d'émigration offerte à la population reste cependant très limitée. L'information est lente et peu sûre, les coûts de transport bien que moindres sont encore un handicap pour beaucoup, les risques n'ont pas disparu, etc. Surtout il n'y a qu'une alternative : rester ou partir définitivement. Dichotomie dont les conséquences sur les déterminants de l'émigration sont fondamentales. La relation démo-économique prend désormais toute son importance; l'incitation à émigrer sera d'autant plus forte que la pression économique sera accentuée Les éléments du long terme l'emportent sur les variations du court terme. L'émigration apparaît très sélective quant aux âges, l'état matrimonial, le niveau d'éducation S'efforçant de minimiser les coûts d'adaptation, l'émigrant tient compte de la distance culturelle et exprime une préférence pour les colonies, les pays de même langue ou de culture similaire. Au fur et à mesure de l'écoulement du temps, des "effets en chaîne" entretiennent un mouvement cumulatif dont le rythme est réglé par les accidents de la conjoncture économique.

17. La situation présente des migrations illustre un troisième moment de l'évolution. L'effet conjugué de la disparition progressive des freins et de l'ouverture d'une possibilité d'émigration temporaire modifient les déterminants d'un calcul rationnel et élargissent la population susceptible d'émigrer. Cette situation nouvelle résulte des effets de *feedback* de l'émigration ancienne et plus encore de l'intervention des pays demandeurs d'emploi qui, par les accords de main-d'œuvre signés avec les principaux pays d'émigration potentielle, ont non seulement levé les obstacles juridiques au départ, mais plus encore permis une diffusion rapide des postes d'emploi vacants, réduit (et même fait disparaître) les coûts de transports, les coûts de recherche d'emploi, l'incertitude liée à l'émigration, etc Désormais, le choix n'est plus uniquement entre rester ou partir définitivement S'ajoute une troisième possibilité, s'absenter pour un nombre limité d'années

18 Les déterminants de ce nouveau type de migration ne coïncident pas avec ceux d'une émigration définitive La distance culturelle n'est plus qu'une contrainte de second rang Le candidat au départ est désormais davantage sensible aux variables du court terme qu'aux caractères permanents du long terme et l'élasticité de la migration aux indicateurs économiques se trouve accrue On assiste de ce fait à un double élargissement des catégories d'émigrants éventuels , ceux qui hésitaient à partir car ils considéraient l'issue trop incertaine ou trop onéreuse, ceux surtout, qui ne pouvaient songer à quitter leur pays définitivement et qui sont prêts à accepter une expatriation temporaire chef de famille, petit propriétaire dont le revenu agricole assure à peine un niveau de subsistance, et qui peut confier son exploitation à un parent, pendant son absence, jeunes filles qui trouvent facilement à se placer dans le personnel domestique, etc

Logique de la décision d'émigrer

19. On peut définir dans un ensemble géographique donné des zones probables d'émigration et d'immigration. Une région d'émigration est un ensemble géographique restreint, relativement homogène, en particulier du point de vue de l'information reçue et transmise par ses habitants Une région d'immigration est caractérisée en revanche par le niveau des prix et des salaires.

20. Soit Y · le revenu total , W . le salaire nominal ; C : la consommation ; S . l'épargne , P . le niveau des prix et i et j les indices des régions d'émigration et d'immigration Si on admet pour simplifier que les consommations se réduisent à deux catégories : alimentaires C_1 et de logement C_2, que l'épargne dans le pays d'origine et le revenu non salarial dans l'une ou l'autre des régions est nul, on a les relations de définitions suivantes :

$$Y_i = C_i$$

$$Y_j = C_{1j} + C_{2j} + S_j$$

21. Dans ce modèle simplifié, de quoi d[illegible] la décision d'émigrer ? Dans l'hy[illegible]

[10] P. A. Morrison, *Theoretical Issues in the Design of Population Mobility Models*, Santa Monica, Californie, The Rand Corporation, 1969

définitive, toutes choses égales par ailleurs, la condition nécessaire, mais non suffisante, pour que l'émigration ait lieu, est que le revenu réel anticipé dans la région d'immigration soit supérieur au revenu réel effectif dans la région d'origine :

$$\frac{Y_i}{P_i} p < \frac{Y_j}{P_j} r$$

p et r étant respectivement les probabilités de toucher un revenu donné dans le pays d'origine et de destination. Par hypothèse, $p = 1$ alors que r peut varier entre 0 et 1. La décision d'émigrer dépend donc tout à la fois de la différence de revenu et de r. La condition nécessaire et suffisante pour que l'émigration ait lieu est que l'incitation financière à émigrer (résultat de l'inégalité précédente) excède les coûts non économiques du déplacement. Les coûts sont d'autant plus élevés que la distance culturelle entre les deux pays est grande.

22. Dans l'hypothèse d'une émigration temporaire, le schéma est différent : l'émigrant éventuel va comparer son revenu réel effectif Y_i/P_i au revenu réel anticipé dont il jouira dans sa propre région, grâce à l'épargne qu'il pourra se constituer sur le salaire perçu dans le pays d'immigration. Il convient de tenir compte cependant du fait que tout émigrant temporaire devra consommer sur place (en j) une partie du salaire perçu. On a donc :

$$\frac{W_i}{P_i} < \frac{C_{1j}}{P_j} + \frac{C_{2j}}{P_j} + \frac{S_j}{P_i}$$

Du fait de l'atténuation des variables non économiques dans cette phase de la migration et de la réduction de l'incertitude quant au revenu anticipé ($r = 1$), on définit par cette inéquation la condition nécessaire et suffisante à l'émigration.

23. Envisagée du point de vue de l'émigrant éventuel, cette inéquation comporte deux séries de variables :

a) Celles sur lesquelles il ne peut agir, données pour le migrant W_i donné au départ, W_j déterminé par les conditions économiques générales et l'entreprise du pays d'accueil : l'immigrant est un "*price taker*" et non "*price maker*", P_i et P_j donnés par le système économique (encore que dans le long terme influencés par le volume de l'émigration) C_{1j} consommation alimentaire incompressible (minimum de subsistance) ;

b) Celles sur lesquelles il peut espérer agir : la consommation de logement (C_{2j}) et, par voie de conséquence, l'épargne (S_j). On peut penser qu'au-delà d'un minimum incompressible, la consommation de logement est fonction du statut social. L'une des façons de restreindre sa consommation de logement sera pour le migrant d'accepter un changement de statut social. En définitive, la conduite rationnelle d'un émigrant temporaire sera de maximiser son épargne S_j (en minimisant C_{2j}) et de maximiser son pouvoir d'achat en "consommant" cette épargne dans son pays d'origine.

24. La logique de la décision d'émigrer peut être illustrée par un graphique simple. On porte respectivement en ordonnée et en abcisse la quantité de biens qu'un revenu monétaire donné permet d'acquérir dans la région d'émigration (OB) ou dans la région d'immigration (OD). La pente de la ligne de revenu (BD) exprime le rapport des prix entre la région d'émigration i et la région d'immigration j. Si $P_i = P_j$, on a évidemment $OB = OD$; le réseau de droites parallèles à BD exprime les différents niveaux de revenus dans les deux régions pour un même rapport $P_i/P_j = 1$. Si $P_i/P_j < 1$, on a un nouveau réseau de lignes de revenu qui tient compte de l'écart du niveau des prix entre les deux régions. Pour un même revenu nominal, le pouvoir d'achat en j est alors inférieur au pouvoir d'achat en i. La condition nécessaire, mais non suffisante pour que l'incitation à émigrer existe est évidemment que le rapport des salaires soit supérieur au rapport des prix. On introduit alors la contrainte de consommation dans les pays d'immigration. Pour simplifier, on affecte les rapports prix et salaires de valeurs numériques, par exemple $P_i = 2P_e$ et $W_i = 3W_e$. Pour faciliter la présentation, on exprime les données en indices sur la base $Y_i = 100$. Par définition, $P_i = 1$.

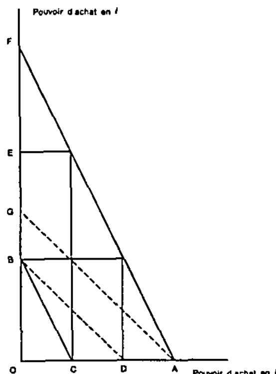
25. Ainsi, un émigrant dont le revenu au départ est $Y_i = 100 = OB$ peut souhaiter le maintien de son niveau de vie pendant son séjour à l'étranger où il consommera OD, ce qui lui permet une épargne DA, qui, rapportée aux prix de i, correspond à un revenu OB. son revenu total aura été de 200 et le gain net de 100. Inversement, un émigrant qui, avec le même revenu de départ OB, accepte pendant son séjour à l'étranger de restreindre sa consommation à OC, pourra, grâce à l'épargne dégagée, consommer OE au retour. Le revenu réel total s'élève à 250 et le gain net à 150. Les quatre types de stratégies décrites dans le graphique sont résumés dans le tableau qui suit :

Gains nets d'après les différentes stratégies

(rapports de prix et de salaires donnés)

Décisions	*Revenu réel total*	*Gain net*
I. N'émigre pas	$OB = 100$	0
II. Emigre définitivement	$OA = 150$	$OA - OB = DA = 50$

Décisions	*Revenu réel total*	*Gain net*
III. Emigre temporairement en conservant pendant son séjour en *J* son niveau de vie *I*		
$\frac{C_I}{P_J} = OD$	$OD + OB = 200$	$OD + OM - OB = 100$
IV. Emigre temporairement en acceptant une réduction provisoire de son niveau de vie initial		
$\frac{C_I}{P_J} = OC$	$OC + OE = 250$	$OC + OE - OB = 150$



26. Le graphique et le tableau correspondant montrent les gains respectifs dans différentes hypothèses possibles. Ces gains résultent de l'addition d'un effet de prix et d'un effet de revenu. Il apparaît en particulier que si l'émigration temporaire est toujours plus avantageuse que l'émigration définitive, le gain net en cas d'émigration temporaire peut varier dans des proportions très importantes selon le niveau de vie que l'émigrant souhaite conserver lors de son séjour dans le pays d'immigration. A l'évidence, ce modèle se prête facilement à l'analyse des effets d'une modification de l'une des variables sur la décision d'émigrer (ou de quitter le pays d'immigration); on songe en particulier à une hausse instantanée et substantielle de salaires de certaines catégories professionnelles ou plus encore à une dévaluation (ou à une réévaluation)

27. De ce schéma simplifié, on peut tirer deux enseignements.

a) L'évaluation de l'avantage comparatif de l'émigration temporaire par rapport à l'émigration définitive et la mise en évidence de situations où l'incitation à émigrer définitivement est nulle, alors que l'émigration temporaire apporte un gain net au migrant, ce qui explique le développement de la migration dès lors qu'apparaît la possibilité d'expatriation temporaire Un résultat paradoxal, mais non improbable, serait d'observer un accroissement de l'émigration temporaire parallèle à une atténuation des différences des salaires entre deux pays, l'émigration temporaire se substituant à l'émigration définitive,

b) La présence de situations (qui n'apparaissent pas dans l'exemple chiffré proposé, mais qui s'en déduisent facilement) où la réduction provisoire du niveau de vie (par rapport à celui qu'il avait dans son pays d'origine) constitue une condition nécessaire à l'existence d'un gain net.

28. On peut souligner deux implications de ce modèle. Il ressort en effet que l'épargne du migrant ne peut être considérée comme un résidu et appelle une analyse spécifique. Par ailleurs, le modèle suggère une interprétation nouvelle de l'extension du recrutement, que l'on observe dans les politiques de tous les pays récepteurs. On a coutume de parler à cet égard d'élargissement des sources, c'est-à-dire soit de signature d'accords avec des pays jusque-là en dehors du champ d'action, soit d'un élargissement géographique à l'intérieur d'un même pays. En réalité, cette façon de voir néglige un des éléments essentiels du mécanisme : la diffusion de l'information. Concurremment à un élargissement, on assiste à un approfondissement des sources. Le caractère cumulatif du phénomène est particulièrement accusé. Ainsi, pour des niveaux de revenu réel équivalents, l'émigration qui prend naissance dans une zone géographique donnée a tendance à s'accroître de plus en plus, avant même, ou en même [illegible] que sont touchées d'autres zones [illegible] une très forte dispersion des

Désaffection des nationaux, structures de préférence des immigrants et demande de main-d'œuvre étrangère

29. L'appel à la main-d'œuvre étrangère conduit à s'interroger sur les causes de la pénurie de main-d'œuvre des économies développées, du recours à une main-d'œuvre étrangère, du caractère permanent de cette immigration et les mécanismes qui permettent l'ajustement des offres aux demandes. Ce suremploi catégoriel est attribué à la désaffection des nationaux à l'égard de certains emplois. Analysant les causes de cette désaffection, J. Dupront[11] souligne d'une part "l'évolution divergente de l'emploi industriel et des aspirations des travailleurs", d'autre part "le caractère défectueux des conditions de travail". Si l'on examine les postes de travail délaissés par les nationaux, on observe qu'il s'agit d'emplois : *a*) mal rémunérés ; *b*) peu qualifiés et particulièrement pénible ; *c*) sensibles aux fluctuations conjoncturelles ; *d*) sans réelle possibilité de promotion.

30. La croissance de l'économie nationale entraîne et implique un accroissement de la population active. La dynamique de l'emploi et la désaffection des nationaux à l'égard de certains emplois tend à concentrer la pénurie dans certains types d'emplois spécifiques. Supposons alors qu'il existe une possibilité d'appel à une main-d'œuvre étrangère pour ces emplois. Le problème est de savoir si les conditions de recours à cette main-d'œuvre restent "avantageuses" pour l'entreprise. La réponse ne fait aucun doute, un tel recours n'entraîne pas de coûts spécifiques par rapport à l'embauche de nationaux, mais bien au contraire, présente des avantages financiers importants. On ne s'étonne pas alors qu'une fois le processus enclenché, l'immigration tende à se développer cumulativement. A terme, un tel processus a des effets d'une grande importance : la disparition d'un marché unifié de l'emploi et la balkanisation du marché du travail, et l'éventualité d'une modification fondamentale du caractère complémentaire de la main-d'œuvre étrangère qui amène à poser le problème de la complémentarité et de la substituabilité.

31. Il résulte que le recours à la main-d'œuvre étrangère aura tendance à se concentrer (ce qui ne préjuge pas d'une extension dynamique à d'autres secteurs) dans certains types d'emplois propres à certains secteurs, que la détermination des secteurs demandeurs de main-d'œuvre étrangère ne sera pas nécessairement fonction, comme il est souvent admis : *a*) du caractère progressif ou en déclin de ces industries ; *b*) de l'importance du progrès technique dans ces industries ; *c*) de la possibilité de substitution du capital au travail dans ces industries, qu'au contraire cette concentration dépendra de *d*) des conditions de gestion et de la stratégie de l'entreprise, éléments qui sont liés dans une certaine mesure à *a*), *b*) ou *c*). Le processus qui conduit à faire appel à la main-d'œuvre étrangère pour pallier la carence des nationaux, conduit progressivement à "chasser" toute main-d'œuvre nationale de certains types d'emplois. En effet, il y a une "dynamique des métiers médiocres" : parce que les conditions de travail y sont mauvaises et les salaires insuffisants, les Français ne vont pas travailler dans le bâtiment. Mais parce que les emplois du bâtiment sont laissés aux Nord-Africains et aux Portugais, les conditions de travail y restent mauvaises et les salaires insuffisants[12].

32. On a alors une séquence du type :

Caractéristiques des postes de travail disponibles ———→ désaffection des nationaux ———→ recours à l'immigration ———→ réticences sociologiques ———→ désaffection des nationaux

Complémentarité et substituabilité

33. La crainte de voir la main-d'œuvre étrangère faire concurrence à la main-d'œuvre nationale et occuper les postes qui pourraient l'être par des nationaux est à la base des réflexes d'hostilité du monde du travail à l'égard de l'immigration. La réponse à cette crainte est connue. La structure de l'emploi et de qualification des étrangers n'est pas la même que celle des chômeurs; il s'agit d'une main-d'œuvre complémentaire dont la venue a pour effet non seulement de ne pas augmenter le chômage des nationaux, mais plus encore de créer des emplois induits de nature à résorber partiellement ce chômage.

34. En réalité, la distinction du complémentaire et du substituable n'est pas une distinction stable. Il y a dans l'analyse précédente des éléments susceptibles de transformer insensiblement à terme l'immigration en force de travail concurrençant les nationaux, même si au départ le recours à la main-d'œuvre étrangère ne s'est fait que parce qu'il n'a pas été possible de trouver un national pour l'emploi en question. La pénurie d'offreurs de travail contraint à une transformation des conditions de travail et des rémunérations des emplois vacants. L'emploi pénible et mal rémunéré en t qu'un travailleur étranger occupe restera pénible et mal rémunéré en $t + 1$. En l'absence d'immigration étrangère, cet emploi vacant devra être revalorisé quant aux conditions de travail et au salaire. C'est effectivement ce qui devra se produire à terme pour que l'entrepreneur puisse éliminer le goulot main-d'œuvre. Il est clair alors que s'il n'y a pas concurrence entre les nationaux et les étrangers à un moment donné, le recours permanent à l'immigration empêche "l'évolution" de certains types d'emplois et, par là, même, "supprime" des emplois qui pourraient à l'avenir (en $t + 2$) être susceptibles d'être occupés par des nationaux.

35. Le second élément à considérer est la stratégie à long terme de l'entreprise. On peut supposer que l'employeur est incité à choisir une méthode de production en considération du fait qu'il existe une offre illimitée de travail. De plus, si l'employeur a l'assurance

[11] J. Dupront, "La désaffection à l'égard de l'emploi industriel", *Rapport de la Commission de l'emploi*, cinquième Plan de modernisation, Paris, la Documentation française, 1969.

[12] J. P. Maillart, *Le nouveau marché du travail*, Paris, éditions du Seuil, 1968.

de pouvoir toujours trouver la main-d'œuvre nécessaire il sera enclin à ne pas céder aux demandes de hausses de salaires en attendant de recruter des immigrants [13].

L'équilibre de l'emploi

36. Entre l'offre de travail des candidats à l'émigration et la demande de travail immigré des entreprises du pays récepteur, comment et à quel niveau va s'établir l'ajustement ? L'analyse des mécanismes de la migration souligne le caractère déterminant du marché, au détriment des facteurs institutionnels. Il existe dans la généralité des cas, qu'il s'agisse des pays d'émigration ou d'immigration, des organismes nationaux, à caractère public ou multipartite, qui ont la responsabilité du bon fonctionnement des migrations. Une première façon d'analyser ce cadre institutionnel consiste à considérer que l'on est en présence d'un monopole bilatéral de l'offre et de la demande de travail Une telle interprétation, par trop juridique, ne correspond nullement à la réalité des mécanismes d'ajustement. Il apparaît tout au contraire que l'effet véritable du cadre institutionnel est de rapprocher le marché de la migration d'un marché de concurrence. Le rôle des organismes officiels est d'assurer la transparence du marché (information sur les conditions de salaire et de travail, formation . . .) de faciliter "l'homogénéisation" des facteurs (sélection médicale et professionnelle, etc.), d'annuler les coûts de recherche d'emploi, de transport, etc., éventuellement même réduire les coûts spécifiques supportés par les hommes mariés. Plus généralement, de l'expérience comparée des politiques de recrutement des divers pays concernés, qu'il s'agisse des pays d'émigration ou d'immigration, une conclusion se dégage nettement : plus la procédure institutionnelle de recrutement se rapproche des mécanismes du marché, plus elle se révèle efficace. Plus elle s'en éloigne, plus la migration irrégulière tend à se développer.

IMMIGRATION ET MODE DE CROISSANCE DES PAYS RÉCEPTEURS

37 Le problème est de savoir dans quelle mesure l'immigration constitue une condition permissive ou une condition nécessaire à la croissance et en quoi le recours à l'immigration marque la préférence pour un mode de croissance spécifique. On examinera successivement l'incidence de l'immigration sur le produit national et la croissance, le niveau général des prix et la balance des paiements, l'élasticité du système économique.

Immigration, équilibre macroécomique et croissance

38. "A moins que l'économie ne soit soumise à des effets extrêmement pervers, il est clair, écrivent Jones et Smith [14], que l'immigration, en augmentant les ressources du pays en main-d'œuvre, accroît le produit total." Cette remarque d'évidence laisse deux questions en suspens L'immigration agit-elle positivement sur le revenu réel par habitant, l'effet de l'immigration est-il plus ou moins accusé que celui des autres facteurs de production (capital et travail national) ? Le problème ne doit pas être sous-estimé. En effet, ainsi que l'observe Mishan [15], à partir du moment où un gouvernement se fixe comme objectif un taux de croissance global, et non un taux de croissance réel par tête d'habitant, il importe peu que ce taux soit effectivement atteint grâce à l'immigration de main-d'œuvre, "même si la main-d'œuvre importée a des chances d'être moins efficiente et moins adaptable que la main-d'œuvre indigène".

39 A ces deux questions, une analyse économétrique *ex post* des composantes du taux de croissance d'un pays donné, au cours d'une période de temps donnée, peut apporter des éléments de réponse Ainsi J L Reifferts [16], dans la première partie de son étude sur le rôle de l'immigration des travailleurs dans la croissance de la R.F A de 1958 à 1968, introduit une fonction de production du type Gobb Douglass, en procédant à une décomposition du facteur travail en trois éléments emploi national, emploi étranger, durée du travail Reiffers conclut qu'"en longue période, une augmentation de l'emploi étranger se traduira par une augmentation du produit nettement inférieure à celle qui aurait pu être obtenue, soit *a*) à partir d'une augmentation du stock de capital, *b*) à partir d'une augmentation de l'emploi national, *c*) ou enfin, à partir d'une augmentation des heures travaillées" Ces résultats s'expliquent par la valeur des différentes élasticités de substitutions, en particulier, la productivité marginale des étrangers n'atteint, en fin de période, que 50 p. 100 de celle des nationaux

40. Une offre illimitée de travail, sous la forme d'un recours continu à l'immigration, a une incidence sur l'accumulation du capital et le progrès technique. Le problème est de savoir dans quelle mesure l'immigration répond à une capacité de financement ou à un outillage oisif préexistant ou/et est associée à un investissement neuf ? Si l'immigration est indépendante du rythme de développement du pays récepteur et par conséquent ne résulte pas d'une demande excédentaire d'emploi, c'est-à-dire d'un exédent de capital disponible, elle risque d'être sans effet sur le produit global (Harrod-Domar). De plus, si l'immigration intervient dans une situation de pleine utilisation des capitaux, l'éventualité d'une baisse du revenu réel imputable à l'immigration n'est pas exclue.

41. Pour que la demande de capitaux induite par les besoins des immigrants pose un problème, il faut

[13] E. J. Mishan, "Does immigration confer economic benefits in economic issues?" Immigration (Londres), 1970, p 91 à 122.

[14] K. Jones et A D. Smith, *The Economic Impact of Commonwealth Immigration*, Cambridge, Cambridge University Press 1970

[15] E. J Mishan, *Growth, The Price We Pay*, Londres, [illegible] Press, 1969, p 79 à 82.

[16] J. L. Reifferts, "Le rôle de [illegible] dans la croissance de la [illegible] 1958 à 1968", Bureau [illegible]

supposer tout à la fois une immigration massive et le plein emploi des capitaux au départ. Ainsi, par exemple, pour un accroissement de population active (imputable à l'immigration) d'environ 2 p. 100 par an, l'accumulation du capital (dans une approche Harrod-Domar) doit s'accroître également de 2 p. 100 par an, ce qui, pour un coefficient de capital de 4, par exemple, implique un investissement additionnel de 8 p. 100 du revenu national. Dans une telle hypothèse, on peut redouter des effets inflationnistes et de déséquilibre de la balance des paiements imputables à l'immigration. Mais il s'agit d'un cas limité.

42. L'immigration exerce un effet positif sur l'accumulation du capital. Certes, bien que les immigrants aient une propension à épargner supérieure aux nationaux de même catégorie professionnelle, la majeure partie de cette épargne étant envoyée au pays d'origine, on est fondé à considérer que l'immigration diminue le financement de la formation de capital par les ménages. Mais là n'est pas l'essentiel. L'incidence de l'immigration sur l'accumulation du capital, est surtout liée au bas niveau de salaire des immigrants et aux profits des entreprises qu'il permet de dégager. On retrouve ici le schéma général du modèle de Lewis [17]. Il est bien certain que le recours à l'immigration a pour effet, non pas d'induire une croissance faiblement capitalistique, comme le laisserait supposer une transposition du modèle néoclassique, mais bien au contraire de permettre et d'accentuer l'accumulation du capital. L'immigration contribue très largement à accroître l'autofinancement des entreprises.

43. Du modèle néoclassique, il résulte logiquement que la rareté du facteur travail est un stimulant à l'innovation; a contrario, l'offre illimitée de travail freine la modernisation. Malheureusement, ici, alors qu'il s'agit d'une question fondamentale, la carence de la théorie se double d'une totale incertitude au niveau empirique. S'il est courant d'émettre l'hypothèse selon laquelle l'immigration ralentit les progrès de productivité, les contre-exemples ne manquent pas. Nous avons déjà mentionné le cas où l'immigration a constitué la condition permissive à la modernisation.

44. L'immigration influe sur la répartition fonctionnelle; elle favorise davantage les capitalistes (en général) que les salariés (en général). L'influence de l'immigration sur l'éventail des rémunérations salariales peut être déduite de l'incidence du suremploi, sur les revenus salariaux, en l'absence d'immigration, puis sur les modifications qu'introduit l'immigration à ce schéma. On admet en règle générale qu'en période de plein emploi prolongé, l'éventail des salaires a tendance à se refermer. Cela s'explique du fait que "l'offre des ouvriers non qualifiés est plus élastique que celle des ouvriers qualifiés" [18]. Le recours à l'immigration modifie sensiblement ce mécanisme. En effet, d'une part elle freine la hausse des salaires du secteur à faible productivité, d'autre part, les secteurs à forte productivité sont amenés à accorder des hausses de salaires pour attirer les nationaux. Ce phénomène a été clairement démontré par Maillat [19] : "L'éventail (des salaires) s'est ouvert parce que les branches du groupe I (salaires élevés) ont accordé des salaires supérieurs à la moyenne et les branches du groupe II (salaires bas) des augmentations inférieures", qui ajoute : "l'éventail a commencé de se refermer lorsque la situation inverse s'est produite." Au total, contrairement à ce qui se passe en l'absence d'immigration, l'écart s'élargit.

Immigration et niveau général des prix

45. L'immigration exerce un effet anti-inflationniste [20]. Il convient, pour le montrer, d'examiner la transmission des impulsions du marché du travail au marché des produits et au marché de la monnaie. Nous nous interrogeons pour conclure sur le point de savoir à quelles conditions l'immigration, par sa logique propre, peut être elle-même à l'origine d'un processus inflationniste.

46. Le suremploi provoque des tensions inflationnistes et l'équilibre n'est réalisé que par une réallocation des ressources sans accroissement du produit total. Dans une telle hypothèse, l'immigration permet tout à la fois un ajustement sans inflation et un accroissement du produit total. Elle apparaît donc à l'origine comme une conséquence du suremploi et des tensions inflationnistes qui lui sont associées.

47. Cet effet premier de l'immigration sur l'offre peut être compensé ou accentué, selon la nature de l'immigration, par les implications de celle-ci sur la demande. L'incidence de l'immigration va dépendre du volume et de la structure de la demande additionnelle qu'elle provoque. La fonction de consommation des immigrants est très mal appréhendée par un schéma keynésien. Une analyse correcte de la fonction de consommation des immigrants implique un modèle où le comportement d'épargne est un comportement actif et non pas résiduel. Cette recherche d'une épargne permanente explique le comportement de consommation spécifique du migrant. Sa propension à consommer plus faible que celle du travailleur national dépend non seulement de son niveau de revenu, mais également des habitudes antérieures de consommation.

[17] W. A. Lewis, « Economic development with unlimited supplies of labour », *The Manchester School of Economic and Social Studies*, vol. 22 (1954), p. 139 à 191.

[18] N. Reder, « The theory of occupational wage differentials », *American Economic Review*, décembre, 1955.

[19] D. Maillat, *Structure des salaires et immigration*, Paris, Neufchâtel, 1968.

[20] Voir, par exemple, Kindleberger (1967), Peston (1969), Rossi et Thomas (1971), etc. Les conclusions opposées auxquelles aboutissent Mishan et Needleman s'expliquent par la nature des hypothèses adoptées par ces auteurs. Voir aussi A. A. Rossi et R. Leighton Thomas, "Inflation in the post-war Swiss economy: an econometric study of the interaction between immigration and the labour market", *Schweizerische Zeitschrift für Volkswitschaft und Statistik*, Bâle, 1971, p. 761 à 790; M. Peston, "Effects on the economy", dans *Colour and Citizenship* de E. J. B. Rose, London, Oxford University Press, 1969, p. 639 à 656; C. R. Kindleberger, *Europe's Postwar Growth: the Labour Supply*, Cambridge, Mass., Harvard University Press, 1967.

De plus, à l'accroissement de son revenu correspond une propension marginale à épargner plus forte que celle du travailleur national de même catégorie. Pour ce qui concerne les investissements, l'immigration peut répondre à un investissement préalable ou au contraire être exogène par rapport à l'accumulation du capital, ce qui suppose qu'elle soit associée à des investissements neufs. Cette dernière éventualité n'est acceptable que dans l'hypothèse d'une immigration indépendante de la croissance économique du pays récepteur, ce qui ne correspond pas à la logique même du phénomène étudié Quant aux équipements sociaux nécessaires à l'accueil des immigrants, en règle générale, compte tenu tout à la fois de la nature et des besoins des immigrants et de leur absence de tout pouvoir politique, il est irréaliste de trouver là un facteur d'inflation.

48. Au total, les aspects anti-inflationnistes l'emportent et par conséquent l'analyse du marché des produits renforce l'effet anti-inflationniste originel sur le marché du travail. En définitive, à cause d'une très forte préférence pour la liquidité, on enregistre un effet déflationniste, malgré une telle préférence, l'effet d'encaisse ne joue pas. Quel que soit le schéma théorique de référence, l'immigration a pour effet d'absorber les effets inflationnistes du suremploi qui l'ont engendré.

49. Dans cette perspective, l'immigration est appelée à jouer un rôle déterminant dans la politique conjoncturelle. En effet, par référence à la courbe de Phillips, l'immigration apparaît comme une technique privilégiée permettant de minimiser les coûts inflationnistes d'une politique de plein emploi (et inversement), de minimiser les coûts de chômage d'une politique de stabilité monétaire. En réduisant les tensions inflationnistes, l'immigration accroît le degré de liberté des responsables de la politique économique. Elle permet de concentrer les politiques monétaires et financières sur la stabilité des prix et l'équilibre externe. Parallèlement, en facilitant l'adaptation structurelle de l'offre et de la demande de travail, elle diminue le chômage et rend plus efficace la politique anti-inflationniste. A cet égard, la politique d'immigration a permis, dans certains cas, de faire l'économie d'autres formes d'interventions conjoncturelles.

50. S'il ne fait guère de doute que l'immigration exerce, du fait même des conditions qui l'ont suscitée et des caractéristiques structurelles des entrées, un effet anti-inflationniste, qui se transmet au marché des biens et de la monnaie, on ne peut écarter l'éventualité d'apparition de tensions inflationnistes consécutives à l'immigration. En effet, l'immigration se transforme au cours du temps et elle peut à son tour engendrer des tensions inflationnistes qui auront pour conséquence de susciter une nouvelle immigration, provoquée cette fois par l'immigration elle-même. Ce processus cumulatif auto-entretenu repose sur deux mécanismes de transmission : la dynamique interne du processus migratoire et la prise en compte des incidences de l'immigration sur la croissance. Toute immigration de main-d'œuvre induit, au bout d'un certain temps, une immigration familiale. *Ex post*, il y a toujours un taux relativement élevé d'immigrants qui décident de s'établir dans le pays récepteur Plus généralement, on assiste à un allongement de la durée de séjour qui, indépendamment des intentions de retour des immigrants, se traduit par une diminution du rapport production/consommation nationale des immigrants.

51. Lorsque l'immigration temporaire se transforme en immigration de longue durée, définitive, le risque inflationniste apparaît. La structure particulière de la demande additionnelle des immigrants qui décident de s'installer, ne peut être satisfaite compte tenu des rigidités d'adaptation structurelle de l'offre, en particulier, la ventilation catégorielle d'emploi nécessaire pour répondre aux besoins des immigrants est inadaptée Ce dernier chaînon de l'analyse suggère qu'il existe du point de vue du pays récepteur un rythme optimal de passage d'une immigration temporaire à une immigration définitive. Pour que les effets anti-inflationnistes de l'immigration l'emportent, il faut que les autorités du pays récepteur anticipent les demandes en équipements sociaux des immigrants de façon à prévoir un financement régulier des dépenses nécessaires. A défaut d'une telle intervention, il est probable que s'amorce un processus cumulatif de recours à l'immigration.

Immigration et balance des paiements

52 L'immigration présente deux types d'effets sur la balance des paiements des effets directs et spécifiques, des effets induits qui résultent des modifications qu'elle introduit sur l'équilibre et la croissance Il n'y a pas lieu d'exagérer l'importance des effets directs sur les transferts de salaires, les importations et les exportations. On peut raisonnablement penser que, sur ce premier point, l'effet conjugué de l'action sur les transferts de salaires et les importations d'une part, les exportations d'autre part, dégage un solde légèrement négatif.

53. L'analyse des effets indirects de l'immigration sur l'échange extérieur suppose que l'on puisse répondre à deux questions : de quoi dépendent les importations et les exportations du pays d'activité, en quoi la migration affecte-t-elle les variables des fonctions d'importation et d'exportation ? Les modèles économétriques [illegible]

[illegible]

tion entre immigration définitive et immigration temporaire) et des relations générales du modèle. Il n'est pas surprenant dans ces conditions que les résultats obtenus soient parfaitement contradictoires. Pour Mishan et Needleman, l'immigration détériore la balance extérieure [21] alors que c'est l'inverse qui se produit lorsque

[21] Voir E. J. Mishan et Needleman. La plupart des auteurs britanniques arrivent à des conclusions opposées à [illegible] de Mishan et Needleman. Citons par [illegible] Jones et Smith, *op. cit.*

l'on augmente les flux d'immigrants dans le modèle Fifi [22].

54. Le seul intérêt de ce type d'exercice est de permettre une quantification des effets, dès lors que l'on accepte les hypothèses de départ. Dans l'état actuel de nos connaissances, on ne peut déterminer le sens de la variation. Si l'on suppose que les importations sont fonction du revenu national on doit s'attendre à ce que l'immigration, qui accroît le produit et le revenu national, induise une demande accrue d'importations. L'incidence de l'immigration sur les exportations est problématique. La plupart des auteurs se contentent de reprendre l'hypothèse de l'exogénéité des exportations, ce qui amène nécessairement, mais sans fondement analytique, à conclure que l'immigration déséquilibre la balance des paiements.

55. Notons pour conclure que nous avons laissé de côté le problème des mouvements de capitaux. Il est certain que le schéma traditionnel de la migration transocéanique, de flux de travail et de capital orientés dans la même direction, n'est pas applicable; ni non plus le schéma contraire (échange de capitaux contre main-d'œuvre). Il est possible, en revanche, d'imaginer un modèle triangulaire, où l'Europe industrialisée serait le point de convergence des travailleurs de pays moins développés et de capitaux de pays plus développés (Etats-Unis par exemple).

Migration et élasticité du système économique

56. L'immigration imprime à la croissance des caractères spécifiques. Elle facilite la flexibilité conjoncturelle et la mobilité géographique susceptibles d'assurer une croissance plus régulière. Dans son étude sur l'Allemagne, J. L. Reifferts a remarquablement dégagé l'asymétrie du comportement des entrepreneurs à l'égard du recrutement et du renvoi de la main-d'œuvre étrangère : d'une part, "les travailleurs étrangers ont subi les contrecoups de la conjoncture de façon beaucoup plus nette que les travailleurs nationaux", d'autre part, l'élasticité de l'emploi étranger en période de récession et en période d'expansion apparaît sensiblement différente. Au total, "il faut conclure, écrit Reifferts, qu'à court terme les entrepreneurs n'ont voulu ou n'ont pu utiliser presque uniquement que les variations de l'emploi étranger pour adapter leur emploi effectif à l'emploi désiré" [23].

57. Supposons une tension sur le marché du travail, celle-ci ne peut être éliminée par un progrès de productivité. On doit alors s'attendre à un blocage qui risque d'infléchir la croissance et d'entraîner l'économie dans une récession. Reste alors le recours à l'immigration. Celle-ci permet, au moment où s'est manifestée la tension, de satisfaire immédiatement à l'accroissement nécessaire de main-d'œuvre pour ajuster le produit effectif au produit désiré, accroissement qui sans immigration n'aurait pu être obtenu que dans la longue période. En d'autres termes, sans immigration, le tau de croissance sur la longue période aurait peut-êt pu être maintenu, mais on aurait enregistré dans courte période une fluctuation d'activité.

58. En période de récession, à structure d'empl et de qualifications égales les licenciements ont u caractère discriminatoire quant à la nationalité. L pratique du licenciement des étrangers s'intègre dar la politique générale d'emploi et de production de entreprises : en cas de réduction de l'activité, plusieur alternatives peuvent être envisagées. Telle firme arrêt le recrutement, telle autre préfère licencier, telle autr enfin conserve les étrangers et diminue les horaires d travail. A ces pratiques différentes, il y a une expli cation fondamentale. La politique des entreprises v dépendre des anticipations quant à la durée de l récession et la vigueur de la reprise. L'entrepreneu compare le coût associé à un maintien de la main d'œuvre au travail et le coût de réembauche de nou veaux travailleurs lors de la reprise. En licenciant un main-d'œuvre, à laquelle elle pourra toujours faire appe à nouveau, l'entreprise "stocke" le facteur main-d'œuvr sans avoir à supporter un coût quelconque de stockage dès lors que l'étranger décide ou est contraint d retourner dans son pays, en attendant que la récessior se résorbe.

59. Les avantages microéconomiques de la flexibilité ne sont pas sans contrepartie au niveau macroéconomique. Il y a, en effet, le problème de la pressior exercée sur les salaires par une population étrangère en chômage. Il est certain que des travailleurs étrangers déjà habitués à l'emploi industriel, informés des conditions de travail et de rémunération, éventuellement libres de se porter demandeurs d'emploi dans l'activité de leur choix, entrent directement en concurrence avec une partie importante des travailleurs nationaux. Alors que pour le nouvel immigrant "l'imperfection" du marché assure une certaine "protection", pour le travailleur national, il n'en va plus de même. Cette pression sur les salaires est due non seulement à l'augmentation de l'offre de travail, mais aussi au comportement spécifique du migrant qui dispose d'une marge quant au salaire "acceptable" plus large que le national. De plus, ce sont justement les nationaux les plus défavorisés et les nouveaux arrivants sur le marché du travail qui vont subir les effets de cette concurrence. En ce sens, l'aggravation du chômage des étrangers est pour les employeurs un élément favorable à la reprise et pour les salariés à faible qualification un facteur d'aggravation.

60. Si l'on rejette la thèse selon laquelle la migration est davantage un facteur d'accentuation des fluctuations qu'un amortisseur de conjoncture [24] doit-on cependant considérer que l'immigration introduit certaines contraintes dans la politique conjoncturelle, et qu'elle est susceptible d'accroître la dépendance à l'égard des pays

[22] D. Blais *et al*, "Etude des variantes quantitatives de l'immigration", Paris, Direction de la prévision, 1971; J. Bourgeois-Pichat, "Migration et balance des comptes", *Population*, 1949.

[23] J. L. Reifferts, *loc. cit.*

[24] Thèse soutenue notamment par Fohl. Voir C. Fohl, "Stabilisierung und Wachstum bei Einsatz von Gastarbeitern", *Kyklos* (Bâle), 1967, p. 119 à 146.

fournisseurs. Ces deux thèses, pour avoir un fond de vérité, ne peuvent être acceptées. Certes, un pays qui connaît une immigration temporaire massive, avec un stock d'étrangers "non stabilisés" important, peut éprouver quelques appréhensions si, par exemple, il décide de dévaluer sa monnaie. Mais l'incidence d'une dévaluation n'est pas assez forte pour provoquer des retours massifs; l'expérience confirme que ces craintes ne sont guère fondées. De même l'argument de la dépendance apparaît fallacieux S'il y a dépendance, ce serait plutôt à l'égard du pays récepteur En effet, l'argument de la dépendance du pays récepteur à l'égard du pays émetteur, à cause de la présence d'effectifs étrangers importants, est un exemple de "*no bridge*" du microéconomique au macroéconomique Cette thèse suppose que les immigrants constituent un groupe homogène et organisé, et sont susceptibles de répondre par une action concertée à un ralentissement de l'activité économique du pays récepteur.

Immigration et mobilité géographique

61. Le problème est double . la main-d'œuvre étrangère est-elle plus (ou moins) mobile que la main-d'œuvre nationale ? L'immigration et la mobilité externe des étrangers facilite-t-elle (ou freine-t-elle) la mobilité interne de la population nationale ? La mobilité observée des étrangers est en général inférieure à celle des nationaux Cependant, la mobilité observée des étrangers n'est pas nécessairement un bon indicateur de leur mobilité potentielle Dans la plupart des pays, les étrangers sont soumis à des restrictions juridiques quant à leur mobilité géographique et/ou professionnelle. Lorsque ces limitations n'existent pas, comme c'est le cas pour les immigrants extérieurs nationaux, il semble bien que la mobilité des immigrants est plus élevée que celle des "autochtones".

62 Dans le cas général des immigrants étrangers, le problème peut être abordé de deux façons sur le plan théorique. On peut supposer, soit que la fonction de mobilité admet les mêmes arguments pour les nationaux et pour les étrangers (par exemple âge, sexe, état matrimonial, degré d'instruction, revenu, etc.), soit que le sous-ensemble étranger a un comportement de mobilité spécifique. Les deux hypothèses conduisent au même résultat une mobilité théorique des étrangers supérieure à celle des nationaux

63. Pour ce qui est des implications de l'immigration pour la mobilité des nationaux et en particulier de la relation immigration étrangère/exode rural, le domaine est complexe et peu étudié La première tentation est de transposer les schémas, mieux connus, des migrations passées. La théorie traditionnelle de la migration conclut en faveur d'un ralentissement de la migration interne par suite de l'immigration extérieure S'agit-il pour autant d'un "invariant" propre à la migration ou au contraire d'un modèle spécifique lié aux conditions historiques de l'émigration européenne aux Etats-Unis ? L'immigration étrangère dans l'industrie ne supprime pas l'exode rural. Tout au contraire en occupant les emplois les plus bas de la hiérarchie industrielle, l'immigration étrangère permet d'une part l'accession des ruraux à des postes plus rénumérateurs ou à des postes tertiaires du secteur secondaire, et surtout le transfert direct de certains ruraux, et en particulier des femmes, du secteur agricole au secteur des services En réalité, rien ne permet de définir une relation causale entre la migration externe et l'exode rural, c'est-à-dire d'admettre l'hypothèse d'une substituabilité de la première à la seconde Il est probable que des différences très sensibles existent d'un pays récepteur à l'autre L'incidence de l'immigration sur l'exode rural dépend, notamment, de la phase d'évolution à laquelle se situe le pays étudié, dans la séquence des trois secteurs (Clark-Fourastié) Si l'immigration intervient très tôt dans le développement économique du pays, c'est-à-dire à un moment où les effectifs agricoles sont encore très élevés, elle peut constituer un blocage des migrations internes. Lorsque la migration extérieure s'insère à un moment où le processus d'exode rural est largement amorcé, il est plus difficile de faire des prévisions à cet égard

Emigration et démarrage de la croissance des pays émetteurs

64 L'émigration est-elle de nature à affecter profondément les économies des pays émetteurs ? Quel [illegible]

Dans le passé, en effet, l'émigration était envisagée comme un substitut à un impossible développement C'est parce qu'un pays donné semblait n'avoir aucune chance de se développer que l'émigration apparaissait comme la seule issue possible. Depuis que l'émigration se dirige vers des pays déjà développés et que ces pays se voient accusés d'entraver le développement des pays émetteurs, une démarche défensive de ces pays vise à souligner le rôle que joue ou peut jouer l'émigration dans le développement des pays de départ.

65. Pour tenter d'apprécier l'incidence de l'émigration sur les pays de départ, il importe de dépasser le simplisme des compensations de pression démographique, ou des imputations coûts-bénéfices; et de prendre une vue dynamique d'un phénomène qui se transforme au cours du temps.

La préférence pour le présent. effets sur l'équilibre de courte période

66. Les effets immédiatement perceptibles et directement imputables au départ des travailleurs sont bien connus et n'appellent pas de commentaires particuliers. L'émigration atténue la pression démographique et diminue le chômage et/ou le sous-emploi, tout en maintenant le niveau de production. On doit s'attendre par ailleurs à ce que les transferts de salaires induisent une amélioration des conditions de vie de la famille du migrant Pour apprécier cette incidence, il convient

d'en examiner les différentes affectations possibles. Il y a d'abord le remboursement des dettes contractées pour partir, qu'il y a lieu de retrancher des sommes transférées par le migrant pour mesurer la rentabilité nette de l'émigration. En toute hypothèse, cela ne représente qu'une très faible part des transferts de salaires. S'agissant des "emplois positifs" les transferts peuvent d'abord servir à accroître la consommation des biens nationaux (du pays d'émigration). Une partie importante des fonds épargnés sera affectée à la construction immobilière. L'achat de biens durables produits par le pays d'immigration (ou importés par le pays d'émigration) n'est pas exclue, et pour trois raisons principales : d'abord les prix relatifs incitent l'émigrant à acheter lors de son séjour à l'étranger les biens durables qu'il sait être plus chers dans son propre pays. De plus, si le taux de change officiel de la monnaie du pays d'émigration est surévalué, l'émigrant est tenté d'acheter directement des biens dans le pays d'immigration et de les importer dans son pays lors de son retour. Enfin, l'émigration accentue l'effet d'imitation; des familles modestes sont entraînées à acquérir certains biens durables qui ne sont pas produits par l'économie nationale.

67. Deux implications fondamentales des envois de remises et de leurs effets sur les familles doivent être soulignées :

a) L'amélioration du revenu des membres des familles de ceux qui sont partis s'explique exclusivement par des facteurs monétaires. Elle ne résulte pas d'une transformation des conditions réelles de production, c'est-à-dire d'un accroissement de salaire induit par les départs [25];

b) Les envois de fonds ont un effet dual : d'un côté la relative prospérité des familles qui les reçoivent incite au départ de nouveaux émigrants, soit de la même famille, soit d'autres familles (effet d'imitation et effet d'information) et en cela entretiennent l'émigration; d'un autre côté, par leur volume et l'affectation qui en est faite (en particulier le logement) les remises enracinent les familles au pays et réduisent les départs à l'étranger et l'exode rural (effet de revenu).

68. Qu'en est-il de la population qui n'est pas directement touchée par l'émigration ? Y a-t-il une tendance à la hausse des rémunérations ? et à qui profite-t-elle ? L'économiste qui cherche à identifier l'effet des migrations dans le cadre des hypothèses générales de la théorie économique, conclut logiquement à l'amélioration du niveau de rémunération de ceux qui n'ont pas émigré. Toute diminution de l'offre de travail accroît la productivité marginale et corrélativement le taux de salaire [26]. La pertinence d'un tel schéma repose strictement sur deux séries de conditions, en général non réalisées : le plein emploi des facteurs au départ; l'ajustement mécanique des rémunérations à toute variation de l'offre, c'est-à-dire la concurrence pure et parfaite.

Diffusion des effets de l'émigration dans le circuit économique

La balance des paiements, l'équilibre monétaire et le budget de l'Etat

69. Pour les pays d'émigration les transferts de salaires des émigrants sont, en vérité le *deux ex machina* de la balance des paiements [27]. Il ne fait pas de doute que cet enrichissement apparent constitue la plus forte incitation politique à l'absence d'entraves étatiques à l'émigration. La question de l'efficacité économique de ces rentrées de devises est plus délicate. La réponse dépend de l'importance relative des transferts et de l'affectation de cette capacité accrue d'importations. Après une première phase au cours de laquelle le migrant doit pourvoir à son installation, les envois de fonds vont enregistrer une progression très sensible. Le point de retournement survient lorsque l'émigrant prend une décision sur son avenir. Mais qu'il décide de rentrer ou de s'établir dans le pays récepteur, le résultat est identique, les remises cessent. C'est donc au cours de la seconde étape que les transferts vont représenter une part importante des salaires du migrant. Si l'on combine cette approche microéconomique avec le processus auto-entretenu de l'émigration, il résulte que c'est au bout de quelques années que la conjonction des deux éléments risque de produire son plein effet. Les transferts constituent alors un élément déterminant de l'équilibre de la balance des paiements.

70. Cette capacité accrue d'importations peut servir à financer soit l'achat de biens de consommation, soit l'achat de biens de production. Trois situations peuvent se présenter : l'Etat peut laisser ces devises se porter là où la demande est la plus intense. Un tarif uniforme pour tous les produits discrimine les acheteurs d'après leur pouvoir d'achat et l'inégale répartition des revenus dans le pays d'origine peut avoir pour effet de transférer ce "droit à l'importation" des émigrants à faibles revenus aux classes aisées. On peut admettre que l'Etat introduise une discrimination tarifaire pour encourager l'importation de biens de production. Cela ne saurait suffire à garantir que les biens de production soient préférés aux biens de consommation, car l'argument de la distribution des revenus s'applique de la même façon. Cependant le coût d'importation de ces biens de consommation risque d'être très élevé, et partant, les ressources que l'Etat retire des droits de douane, importantes. Reste enfin l'hypothèse où une politique tarifaire et douanière s'ajoute à une politique contingentaire visant à favoriser les biens de production et

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[25] V. Lutz, "Some structural aspects of the Southern problem; the complementarity of emigration and industrialization", *Quarterly Review* (Rome, Banca Nazionale del Lavoro), décembre 1961.

[26] H. B. Grubel et D. Scott "The international flow of human capital", *American Economic Review*, mai 1966, p. 268 à 274.

[27] A. G. Papandréou, *A strategy for Greek economic development*, Athènes, Center of Economic Research, 1962, p. 62.

à limiter quantitativement les importations de biens de consommation. En définitive, à partir du moment où un pays bénéficie d'importantes remises d'émigrants, il est contraint d'adopter une politique commerciale douanière et contingentaire, s'il ne veut que le seul effet de cet enrichissement n'aille aux groupes aisés; à moins que l'Etat ne préfère, grâce à une politique tarifaire maximiser les revenus douaniers et disposer ainsi d'une possibilité accrue d'intervention financière.

71. La monétarisation des devises va accroître l'offre de monnaie. Les envois de remises des émigrants constituent un parfait exemple d'inflation par la demande. La demande est ici indépendante de l'offre, elle la précède et l'intensité de l'inflation va dépendre de l'élasticité de l'offre Au total, il ne fait pas de doute que les remises ont un fort effet inflationniste qui réduit sensiblement le revenu réel des familles. Cependant, il y a une grande différence entre les familles d'émigrants et les autres Pour les premières, en dépit d'un taux élevé d'inflation, la hausse du revenu réel reste très sensible, pour les secondes, en revanche, l'absorption du pouvoir d'achat par l'inflation est plus accusée, surtout pour les catégories qui ne bénéficient pas indirectement des remises (principalement les salariés qui ne sont pas utilisés dans les secteurs où la demande se trouve gonflée par la demande des migrants)

72. On peut déceler principalement trois types d'effets de la migration sur l'équilibre des dépenses et recettes de l'Etat L'émigration comprime certaines dépenses (chômage, assistance médicale, prestations familiales) Inversement, la politique d'émigration entraîne des dépenses spécifiques création d'un organisme *ad hoc*, assistance aux émigrants, éventuellement frais de préparation au départ, installation d'antennes à l'étranger, etc On peut penser que ces deux éléments contraires s'annulent ou laissent un léger surplus

73. L'accroissement des recettes de l'Etat s'opère essentiellement au travers de la fiscalité indirecte trois séries de raisons suggèrent des rentrées fiscales plus abondantes : la monétarisation accrue d'une partie de l'activité économique jusque-là soustraite à l'économie marchande; l'accroissement du revenu des particuliers, soit par suite des entrées de remises, soit par suite d'une hausse de productivité marginale; le fait que la baisse de la propension à consommer qui devrait résulter d'une hausse de revenus est contrecarrée par la référence à un nouveau modèle de consommation et qu'au total la probabilité est grande que la propension marginale à consommer avoisine l'unité. S'ajoute éventuellement le supplément de ressources douanières

74 Au même titre que la balance des paiements, le

[illegible]

le seul élément d'information de la politique d'émigration. Il est manifeste qu'à court terme, un pays qui connaît une forte émigration, peut anticiper d'importantes ressources budgétaires liées à l'émigration, et promouvoir une politique budgétaire fortement expansionniste.

75. Dans cette analyse de la propagation des effets de la migration dans le circuit économique, les incertitudes sont nombreuses et les conclusions avancées restent hypothéthiques Cependant deux enseignements se dégagent

a) La migration induit certains "effets favorables", elle n'a pas d'action déterminante sur les variables stratégiques du développement. En d'autres termes, il n'y a pas de relation endogène qui dans une économie de marché relie l'émigration et le développement,

b) En revanche, grâce à l'émigration, l'Etat dispose d'une capacité d'intervention beaucoup plus grande.

Le tableau se complique cependant · la migration une fois amorcée suit sa logique propre et la marge de manœuvre de l'Etat risque de se trouver extrêmement réduite

L'hypothèque de l'avenir. dynamique interne de la migration et impératifs du développement

76. Une fois le processus de la migration amorcé, celle-ci se développe par effet cumulatif, indépendamment des facteurs originels qui lui ont donné naissance. Il arrive un moment où les conditions d'origine ont complètement disparu et où la migration s'entretient d'elle-même. Son contrôle échappe alors au pays émetteur Ce processus cumulatif comporte quatre canaux de transmission.

Dynamique démographique

77 L'émigration qui influe directement sur les effectifs et les structures de la population, entraîne indirectement une modification profonde des variables d'accroissement naturel fécondité et natalité L'émigration ralentit le taux d'accroissement naturel, qui parfois même devient négatif Par suite de l'évolution divergente du taux des départs et du taux d'accroissement naturel, il arrive un moment où le premier l'emporte sur le second On pourrait penser que cette tendance vers une population stable n'est pas à déplorer En fait, cela n'est obtenu qu'au prix d'une très importante modification des structures qui se traduit par une baisse très sensible du taux d'activité, un vieillissement de la population et des charges accrues pour les actifs

Dynamique de l'emploi

78. Les pays récepteurs exercent un effet dominant asymétrique La situation de l'emploi des pays émetteurs joue un rôle important dans l'amorce du processus Une fois la migration amorcée, le volume et le rythme sont strictement déterminés par le pays récepteur et indépendants des conditions de l'emploi du pays émetteur Avec le développement de la migration, on assiste au passage d'une situation d'excédent de main-d'œuvre

d'en examiner les différentes affectations possibles. Il y a d'abord le remboursement des dettes contractées pour partir, qu'il y a lieu de retrancher des sommes transférées par le migrant pour mesurer la rentabilité nette de l'émigration. En toute hypothèse, cela ne représente qu'une très faible part des transferts de salaires. S'agissant des "emplois positifs" les transferts peuvent d'abord servir à accroître la consommation des biens nationaux (du pays d'émigration). Une partie importante des fonds épargnés sera affectée à la construction immobilière. L'achat de biens durables produits par le pays d'immigration (ou importés par le pays d'émigration) n'est pas exclue, et pour trois raisons principales : d'abord les prix relatifs incitent l'émigrant à acheter lors de son séjour à l'étranger les biens durables qu'il sait être plus chers dans son propre pays. De plus, si le taux de change officiel de la monnaie du pays d'émigration est surévalué, l'émigrant est tenté d'acheter directement des biens dans le pays d'immigration et de les importer dans son pays lors de son retour. Enfin, l'émigration accentue l'effet d'imitation; des familles modestes sont entraînées à acquérir certains biens durables qui ne sont pas produits par l'économie nationale.

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La balance des paiements, l'équilibre monétaire et [le] budget de l'Etat

69. Pour les pays d'émigration les transferts d[e] salaires des émigrants sont, en vérité le *deux e[x] machina* de la balance des paiements [27]. Il ne fait pa[s] de doute que cet enrichissement apparent constitue l[a] plus forte incitation politique à l'absence d'entrave[s] étatiques à l'émigration. La question de l'efficacit[é] économique de ces rentrées de devises est plus délicate[.] La réponse dépend de l'importance relative des trans[-]ferts et de l'affectation de cette capacité accrue d'im[-]portations. Après une première phase au cours d[e] laquelle le migrant doit pourvoir à son installation, le[s] envois de fonds vont enregistrer une progression trè[s] sensible. Le point de retournement survient lorsqu[e] l'émigrant prend une décision sur son avenir. Mai[s] qu'il décide de rentrer ou de s'établir dans le pay[s] récepteur, le résultat est identique, les remises cessent[.] C'est donc au cours de la seconde étape que le[s] transferts vont représenter une part importante de[s] salaires du migrant. Si l'on combine cette approch[e] microéconomique avec le processus auto-entretenu d[e] l'émigration, il résulte que c'est au bout de quelque[s] années que la conjonction des deux éléments risque d[e] produire son plein effet. Les transferts constituen[t] alors un élément déterminant de l'équilibre de l[a] balance des paiements.

70. Cette capacité accrue d'importations peut servi[r] à financer soit l'achat de biens de consommation, soi[t] l'achat de biens de production. Trois situations peuven[t] se présenter : l'Etat peut laisser ces devises se porte[r] là où la demande est la plus intense. Un tarif uniform[e] pour tous les produits discrimine les acheteurs d'aprè[s] leur pouvoir d'achat et l'inégale répartition des revenu[s] dans le pays d'origine peut avoir pour effet de trans[-]férer ce "droit à l'importation" des émigrants à faible[s] revenus aux classes aisées. On peut admettre que l'Eta[t] introduise une discrimination tarifaire pour encourage[r] l'importation de biens de production. Cela ne saurai[t] suffire à garantir que les biens de production soien[t] préférés aux biens de consommation, car l'argumen[t] de la distribution des revenus s'applique de la mêm[e] façon. Cependant le coût d'importation de ces bien[s] de consommation risque d'être très élevé, et partant les ressources que l'Etat retire des droits de douane importantes. Reste enfin l'hypothèse où une politiqu[e] tarifaire et douanière s'ajoute à une politique contin[-]gentaire visant à favoriser les biens de production e[t]

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[25] V. Lutz, "Some structural aspects of the Southern problem; the complementarity of emigration and industrialization", *Quarterly Review* (Rome, Banca Nazionale del Lavoro), décembre 1961.

[26] H. B. Grubel et D. Scott "The international flow of human capital", *American Economic Review*, mai 1966, p. 268 à 274.

[27] A. G. Papandréou, *A strategy for Greek economic devel[-]opment*, Athènes, Center of Economic Research, 1962, p. 62

à limiter quantitativement les importations de biens de consommation. En définitive, à partir du moment où un pays bénéficie d'importantes remises d'émigrants, il est contraint d'adopter une politique commerciale douanière et contingentaire, s'il ne veut que le seul effet de cet enrichissement n'aille aux groupes aisés; à moins que l'Etat ne préfère, grâce à une politique tarifaire maximiser les revenus douaniers et disposer ainsi d'une possibilité accrue d'intervention financière.

71. La monétarisation des devises va accroître l'offre de monnaie. Les envois de remises des émigrants constituent un parfait exemple d'inflation par la demande. La demande est ici indépendante de l'offre, elle la précède et l'intensité de l'inflation va dépendre de l'élasticité de l'offre Au total, il ne fait pas de doute que les remises ont un fort effet inflationniste qui réduit sensiblement le revenu réel des familles Cependant, il y a une grande différence entre les familles d'émigrants et les autres Pour les premières, en dépit d'un taux élevé d'inflation, la hausse du revenu réel reste très sensible, pour les secondes, en revanche, l'absorption du pouvoir d'achat par l'inflation est plus accusée, surtout pour les catégories qui ne bénéficient pas indirectement des remises (principalement les salariés qui ne sont pas utilisés dans les secteurs où la demande se trouve gonflée par la demande des migrants)

72. On peut déceler principalement trois types d'effets de la migration sur l'équilibre des dépenses et recettes de l'Etat. L'émigration comprime certaines dépenses (chômage, assistance médicale, prestations familiales). Inversement, la politique d'émigration entraîne des dépenses spécifiques création d'un organisme *ad hoc*, assistance aux émigrants, éventuellement frais de préparation au départ, installation d'antennes à l'étranger, etc On peut penser que ces deux éléments contraires s'annulent ou laissent un léger surplus.

73. L'accroissement des recettes de l'Etat s'opère essentiellement au travers de la fiscalité indirecte · trois séries de raisons suggèrent des rentrées fiscales plus abondantes · la monétarisation accrue d'une partie de l'activité économique jusque-là soustraite à l'économie marchande, l'accroissement du revenu des particuliers, soit par suite des entrées de remises, soit par suite d'une hausse de productivité marginale; le fait que la baisse de la propension à consommer qui devrait résulter d'une hausse de revenus est contrecarrée par la référence à un nouveau modèle de consommation et qu'au total la probabilité est grande que la propension marginale à consommer avoisine l'unité. S'ajoute éventuellement le supplément de ressources douanières

74 Au même titre que la balance des paiements, le budget de l'Etat va apparaître comme l'indice [illegible] immédiat du caractère positif ou négatif de la migration. Tant que l'analyse approfondie de l'incidence de [illegible] gration sur l'économie nationale n'est pas [illegible] l'évolution de ces deux indicateurs [illegible] le seul élément d'information de la [illegible] gration. Il est manifeste qu'à [illegible]

qui connaît une forte émigration, peut anticiper d'importantes ressources budgétaires liées à l'émigration, et promouvoir une politique budgétaire fortement expansionniste

75. Dans cette analyse de la propagation des effets de la migration dans le circuit économique, les incertitudes sont nombreuses et les conclusions avancées restent hypothéthiques Cependant deux enseignements se dégagent

a) La migration induit certains "effets favorables", elle n'a pas d'action déterminante sur les variables stratégiques du développement. En d'autres termes, il n'y a pas de relation endogène qui dans une économie de marché relie l'émigration et le développement;

b) En revanche, grâce à l'émigration, l'Etat dispose d'une capacité d'intervention beaucoup plus grande.

Le tableau se complique cependant : la migration une fois amorcée suit sa logique propre et la marge de manœuvre de l'Etat risque de se trouver extrêmement réduite.

L'hypothèque de l'avenir : dynamique interne de la migration et impératifs du développement

76. Une fois le processus de la migration amorcé, celle-ci se développe par effet cumulatif, indépendamment des facteurs originels qui lui ont donné naissance. Il arrive un moment où les conditions d'origine ont complètement disparu et où la migration s'entretient d'elle-même. Son contrôle échappe alors au pays émetteur. Ce processus cumulatif comporte quatre canaux de transmission.

Dynamique démographique

77. L'émigration qui influe directement sur les effectifs et les structures de la population, entraîne indirectement une [illegible] profonde des [illegible] d'accroissement naturel : [illegible] et natalité [illegible] gration ralentit le taux d'accroissement naturel, qui [illegible] fois même [illegible] Par suite de l'évolution divergente [illegible] et du taux d'accroissement [illegible] un moment où le [illegible] [illegible] On pourrait penser que [illegible] [illegible] population stable n'est pas [illegible] [illegible] obtenu qu'au prix d'un [illegible] [illegible] des structures qui se [illegible] [illegible] du taux d'activité [illegible] [illegible] population et des charges [illegible] [illegible]

[illegible]

[illegible] exercent [illegible] [illegible] de l'emploi [illegible] [illegible] dans l'ar[illegible] [illegible] amor[illegible] [illegible] [illegible] [illegible]

à une situation de pénurie. Il n'est pas improbable d'observer alors simultanément une émigration et une pénurie de main-d'œuvre. Cette conjonction, paradoxale, lorsque l'on prend une vue transversale du phénomène, traduit les contradictions entre les éléments qui ont donné lieu à l'émigration, et la logique propre de celle-ci.

Dynamique des envois de salaires

79. Il n'est pas jusqu'aux envois de remises qui, véritable manne à court terme, ne soient susceptibles de tourner au désavantage du pays qui les reçoit. En dehors de l'aspect inflationniste, les envois de devises ne comportent pas en eux-mêmes, de côté négatif; ils contribuent cependant à entretenir le *statu quo*, et de ce fait, empêchent toute modification nécessaire au développement. Les envois de remises améliorent très sensiblement les revenus de la génération présente mais n'induisent aucune accumulation du capital susceptible de garantir aussi l'accroissement du revenu des générations futures. Une conclusion fondamentale s'impose; un pays qui a vu le revenu par tête s'accroître grâce aux remises est condamné à exporter sa force de travail, s'il ne veut pas voir diminuer ce revenu à la prochaine génération [28].

Effets de propagation de la mobilité interfrontières

80. La mobilité interfrontières entraîne trois séries de conséquences : elle incite à l'achat dans le pays d'activité de biens durables. Elle a un rôle fondamental dans la transmission et la diffusion de l'information, enfin elle permet du moins pour un temps de maintenir la famille au pays.

L'illusion du retour productif

81. Pour le candidat à l'émigration, l'idée du retour accroît la propension à émigrer. Pour le pays de départ, le mythe du retour est l'un des éléments irrationnels les plus trompeurs dans l'analyse du phénomène de la migration. En réalité, par suite du caractère sélectif des retours et des obstacles à la réinsertion productive, il faut craindre que les retours n'aggravent la situation des économies sous-développées. Les retours sont sélectifs à rebours. Le pays d'immigration exerce en effet une attraction sur les meilleurs éléments de l'émigration.

82. Le premier obstacle à la réinsertion productive résulte de divergence entre les aspirations du migrant et les impératifs du développement. La rationalité économique voudrait que le migrant de retour tire profit de son acquis industriel et prenne place dans le processus d'industrialisation. C'est oublier l'impact des structures mentales. Ce que vise le migrant c'est avant tout une ascension économique et sociale. Si l'on admet que pendant la durée d'absence, les structures sociales n'ont pas changé ; c'est par référence à ces structures que le migrant cherche à affirmer son ascension. Dans ces sociétés, le signe le moins équivoque de la mobilité sociale c'est l'indépendance qui se traduit sur le plan personnel par l'acquisition d'une maison et sur le plan professionnel par la préférence pour les métiers non agricoles et non salariés.

83. Le second obstacle résulte de la lenteur des évolutions structurelles du pays d'émigration comme l'observe fort justement Polyzos [29] "par le canal migratoire des ruraux sous-employés avant l'émigration se transforment au retour en chômeurs officiellement enregistrés, tout au moins pendant quelques mois"; d'autre part, une partie des femmes qui, avant l'émigration étaient inemployées ou employées dans l'agriculture, va désormais se porter sur le marché de l'emploi industriel ou tertiaire. L'émigration, en effet, accroît le taux d'activité des femmes.

84. On peut craindre dans ces conditions que les retours ne soient un facteur d'aggravation, et pour trois raisons :

a) A l'inflation par la demande induite par les transferts de salaires s'ajoute une inflation par les coûts du type de celles que Lerner [30] a identifiées en Israël. Les entrepreneurs du pays d'émigration, anticipant les hausses de salaires que vont exiger les émigrants de retour, habitués à des salaires plus élevés, vont accroître leurs prix avant même que les hausses effectives de coût n'aient lieu;

b) A son retour, le migrant va préférer exercer une activité tertiaire ou indépendante. L'émigration extérieure n'est donc plus le relais qui permet la mutation structurelle primaire/secondaire, mais tout au contraire, le processus qui permet, en définitive, d'échapper au travail industriel. En ce sens, elle aggrave l'allocation des ressources et compromet fortement le développement. A cet égard, il est remarquable de constater que les "professions exercées à l'étranger n'ont aucune influence sur les projets professionnels des migrants";

c) Du point de vue de l'implantation géographique, l'on admet que la probabilité est extrêmement faible de voir un travailleur urbain retourner à la campagne après son émigration. Le problème est donc de déterminer dans quelle mesure l'émigration externe a favorisé la redistribution interne de la population. Il y a des contraintes opposées qui conditionnent le choix du migrant, la décision dépend cependant du migrant lui-même. Le choix de la région de retour peut être considéré comme un indicateur de la signification de la migration pour le migrant et de l'imprégnation des valeurs de la société industrielle. Certains

[28] A moins évidemment que les ressources ne soient affectées à des emplois productifs, hypothèse qui contredit la logique de la migration.

[29] N. Polyzos, *Conséquences des retours en Grèce des émigrants*, Paris, Organisation de coopération et de développement économiques, 1970.

[30] Round table on international migration (Colloque sur les relations internationales), Kitzbühel, Autriche, 1955; International Economic Association (Association internationale des sciences économiques); B. Thomas, *Economics of International Migration*, Londres, Macmillan, 1958.

sont partis comme on l'a dit pour savoir rester dans leur "pays"; pour d'autres, l'acceptation des échelles de préférence de la société industrielle entraîne que les "facteurs sociaux vont l'emporter sur les valeurs émotionnelles" [31] et par conséquent "le retour au point de départ perd sa signification". Si l'établissement en milieu urbain se révèle impossible dans le pays émetteur, alors il est probable que l'émigrant de retour prenne à nouveau la décision de repartir vers un pays industriel.

85. Au terme de ce paragraphe, trois séries de conclusions doivent être soulignées.

a) Bien que les conditions permissives de la migration se soient transformées au cours du temps celle-ci *s'auto-entretient par sa logique interne*,

b) Le pays émetteur n'est pas en mesure de maintenir le rythme et le volume des départs dans les limites souhaitables;

c) La réinsertion productive du migrant de retour a peu de chances d'être efficace.

En d'autres termes, il n'existe aucun mécanisme endogène de transmission internationale du progrès économique par le canal de la migration

86. Pour que l'émigration joue un rôle efficace, pour qu'elle soit un élément de la politique de développement et non pas un substitut, des conditions doivent être respectées. En fait, le rythme et le volume des départs et des retours échappent au contrôle des pays d'émigration et, ils ne sont généralement pas en mesure de faire respecter les conditions d'efficacité requises. En économie ouverte, il n'y a pas, en effet, de solution unilatérale au problème du développement et seule une "théorie équilibrée de la migration des travailleurs" [32] intégrant et associant les pays d'émigration et d'immigration peut aider à la solution du problème. Cette collaboration peut constituer une forme efficace de la contribution des pays développés au démarrage de la croissance économique.

87. Au point de départ de cette note, il y a une constatation d'évidence : l'absence de réflection théorique sur les migrations internationales. A l'appui de cette lacune, on peut faire valoir que la migration internationale n'est pas un phénomène inéluctable, qu'il n'y a pas à proprement parler, une fonction de mobilité comme il existe une fonction de consommation ou de production inhérente à l'activité économique, qu'à l'encontre de la mortalité, la migration et tout particulièrement la migration internationale n'est pas un événement nécessaire du cycle de vie Cela ne saurait justifier l'exclusion de la migration internationale du champ d'analyse économique et démographique Dès lors que l'on s'intéresse aux phénomènes nombreux, celle-ci apparaît en effet au même titre que la consommation, la production ou la fécondité, comme un phénomène fondamental.

88 Les migrations internationales constituent un [illegible]

[illegible] prévoir un développement important des migrations internationales, à l'échelle des ensembles régionaux. Il appartiendra à la plupart des pays de définir une [illegible]

[31] A. Corsini et [illegible] families of Italian [illegible] démographique eur[illegible]

[32] X. Zolotes, *Inte*[illegible] *Development with Reference to Greece*, Athènes, Bank of Greece, 1966, repris et traduit dans *Economie appliquée* (Paris), n° 4, 1967

[33] Ce document a été etabli à partir de l'ouvrage de G Tapinos, *L'économie des migrations internationales*, Paris, 1974.

ECONOMIC AND SOCIAL DETERMINANTS OF CONTEMPORARY DEMOGRAPHIC BEHAVIOUR *

Yaropolk N. Guzevatyi **

GENERAL METHODOLOGICAL APPROACH TO STUDY OF DEMOGRAPHIC BEHAVIOUR

1. Man cannot be separated from nature. His life, limited by the acts of birth and death, is a biological phenomenon characteristic of all living beings. Nevertheless, there is a fundamental qualitative distinction of human society from other forms of organic nature. This distinction has been created by the ability for expedient labour, characteristic only of man. It is possible to say that labour created the human being. Man does not exist passively in nature, but actively influences it and accommodates it by means of his labour to his needs. That is why it is impossible to transfer implicitly the laws of fauna life to human society.

2. To live, people get food, build dwellings, develop various means of existence and act co-operatively, joining together for combined activity, resulting in the social character of production and the creation of various productive relations between people. Because of this, a given population should not be regarded as a mere group of people occupying a certain territory, but as a concrete totality in its diversity of productive relationships, taking into consideration subdivisions into classes and various social, professional and other groups that take shape in the course of social production.

3. The social production which is carried on within the framework of the indissoluble unity between productive forces and productive relationships constitutes the main force for the development of human society. Consequently, a history of society is, first and foremost, a history of production, a history of the modes of production. Changes in the latter, resulting from the growth of productive forces and the modernization of instruments of production, cause transformation of the whole social system. The level of the development of productive forces determines, through numerous intermediate factors and relationships, the historical peculiarities in the reproduction of population.

4. This thesis about the decisive role of production in social development should not be taken metaphysically, as if the economic moment were the only decisive one. The concept of economic factors in the absolute proves its value only in abstract scientific research, where it is necessary to determine essential, decisive connexions of pure phenomena, free from subsidiary, secondary circumstances. But any effort to identify the abstract scheme, determined in such a way, with dynamic life will inevitably lead to the impoverishment and deterioration of reality, which is a very intricate complex of interrelated and interacting phenomena. Although economic factors are primarily decisive in this complex of phenomena, their role is not absolute, but remains relative as they are influenced by the many other forces operating in historical development.

5. These interacting forces include, in particular, the demographic factors in which the dual nature of reproduction of real life in human society—that is, the interrelation and interdependence of the biological and the social—is expressed. One cannot correctly assess the current position and forecast the future dynamics of natality, mortality and other demographic trends on the basis of the biological approach alone, without considering, apart from the economic, such social elements as dominant customs and traditions, the cultural level, the level of public health and social welfare, and the political situation, all of which are involved in the process of human reproduction. In its turn, the biological side determines the extent to which the social elements form part of demographic research. The social elements are of interest to demography not in themselves, not in their entirety, but only in so far as they affect the biology of human reproduction. The same is true with regard to the processes of settlement and migration, which are determined not by demographic but, mainly, by socio-economic regularities and which, nevertheless, are studied by demography since they cause changes in the age-sex structure of the population, thus affecting the dynamics of natural reproduction.

6. Although, as mentioned above, demographic factors are secondary, that is, derivative in regard to economics, they, nevertheless, actively influence social development. As a result of this influence, specific problems, so-called problems of population, arise in the economic field, political field, cultural field, and so on. These problems are not universal. They manifest themselves differently in the concrete conditions of various countries and regions of the world. Each coun-

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try has its specific problems, differing in character as a result of the difference in size, structure and rate of growth of the population and its density and distribution, on the one hand, and such factors as the levels of economic and cultural development, the character of productive relations and the peculiarities of the political system and of the state structure, on the other hand.

7. All this does not preclude the making of generalizations for scientific purposes by the two major groups of countries in the world today, namely, those economically developed and industrial and those developing and agrarian, in accordance with the different types of population reproduction occurring in them in the present phase of history.

8. This report is an attempt to examine certain questions pertaining to the influence of economic and social factors on demographic behaviour in these groups of countries.

Demographic behaviour in the developed countries

9. Population reproduction in the modern industrial countries is characterized by moderate or low mortality and birth rates and, as a consequence, by moderate or low rates of natural population increase. This type of population reproduction is the result of the long historical evolution of demographic behaviour in the process of social development.

10. The influence of economic factors on demographic processes manifests itself ultimately in the fact that each new social system and its corresponding mode of production triumphs over the old system by creating a higher level of labour productivity As a result, the society, as a whole, becomes richer and enjoys more favourable living conditions, all of which tends to lower mortality and to lengthen the average life expectancy of the population. Thus, among other things, the industrial revolution that took place at the end of the *eighteenth and the beginning of the nineteenth centuries* contributed to the accelerated process of reduction of mortality in Europe.

11. The role of economic factors in the dynamics of lowering mortality may lessen or increase under the impact of social factors The more equitable the distribution of national wealth, the more accessible [illegible] qualified medical help for wide masses of the population, the more consistent the application [illegible] guarantee for the right to work for the working [illegible] the more just and effective the state system [illegible] security and so on, i e., the more [illegible] set-up, the more favourable become the [illegible] a decline in mortality and a rise in [illegible] expectancy.

12 As for the birth rate, [illegible] in the final analysis, upon [illegible] opment and the development [illegible] relationship is not [illegible]

the medium of socio-cultural and socio-psychological factors. With more social progress based on the growth of the social productivity of labour, and as society goes through the process of industrialization and urbanization, natality gradually declines However, in the complex set of factors affecting the intensity of births, the role of economic and social factors increases while the role of natural, biological factors relatively diminishes. Parents exercise more and more cautiously their choice with respect to the desirable number of children, postponing new births to a more auspicious time or deciding not to have any new births at all.

13 The decline in natality is brought about by the following economic, social and cultural phenomena of major importance·

(a) The considerable decline in infant mortality and, in cases where infant mortality remains high, a high natality, which is to a certain extent compensatory in character;

[illegible]

increased expenses by the family for the rearing of children. The development of the system of social security diminishes the importance of children as supporters of parents in old age);

(c) The emancipation of women, the growing scale of their involvement in social production, education, political and cultural life;

(d) The increase in the social mobility of youth, its growing desire to acquire a higher education and the resulting higher age at [illegible]

(e) The growing material and cultural demands of spouses as a result of the general improvement in the conditions of life;

(f) The [illegible] revolution taking place in the [illegible] which makes society more interested [illegible] quantitative characteristics of [illegible] considerably complicates the [illegible] generation places new [illegible] and, in the final analysis, [illegible] formation of families with fewer [illegible] standard of modern demographic [illegible]

14. [illegible] economic and cultural progress entails [illegible] decline in natality. However, [illegible] limitless, and [illegible] is set by [illegible] human nature. [illegible] economic benefits [illegible] of parents, [illegible]

[illegible] tendency [illegible] at the lev[illegible]

the bearers of parents' ideals; and so on. In the conditions of the technical-scientific revolution in modern times, in the conditions of the accelerated tempo of business life and the nervous stress this revolution has engendered, there becomes ever more apparent a new function of the family as a sort of a "psychological refuge", which also stimulates natality.

16. In some cases, the State sees to it that an excessive drop in natality is prevented by working out, as it has done in France, a system of respective economic, social and administrative-legal measures. The fact of the matter is that, while for individual families the economic necessity of having children is gradually disappearing, this necessity remains for the society as a whole, for, after all, children are the source of the future work force. Apart from that, a decline in natality contributes to the "aging" of population, that is, an increase of people of older ages in the total number of population, which has certain negative economic, social and even political consequences. In particular, public expenses on the maintenance of old people who are unable to work increase. There takes place the "aging" of the work force, of the contingents of the electorate and so on. Of course, no demographic policy can displace the operation of economic, social and cultural factors which determine the main principles of demographic behaviour in the modern industrial countries. But it can help families to overcome the gap (if one exists) between the desired and the actual number of children and thus to produce a rise in natality.

Demographic behaviour in the developing countries

17. A different demographic situation exists in the former colonial and semi-colonial countries of Asia, Africa and Latin America, which are striving to overcome their past economic and cultural patterns and on whose territory there resides 70 per cent of the population of the world. What is witnessed here is a sharp acceleration of the pace of demographic growth as a result of the rapid decline in mortality, especially infant mortality, during the past two or three decades, with natality remaining at a high level.

18. After the Second World War, when the colonial system, in the new countries which have gained their national independence, collapsed, the possibility arose for carrying out, with international assistance, vigorous measures against epidemic diseases and for the improvement of the sanitary conditions of life for the population. Of great, if not decisive, importance has been the appearance in world medical practice of the radically new and effective anti-epidemic methods. The first successes of the young national States in the fields of cultural and economic development have also had a beneficial effect upon the health of their population. In particular, the expansion of the road network and the modernization of transport facilities have facilitated the task of manoeuvring food and other material resources within each country, thereby reducing the risk of localized hunger and epidemics.

19. Thus, the effect of specific, historically determined economic, social and political factors on the dynamics of mortality has brought forth the well-known phenomenon of "population explosion". As for the demographic behaviour of the population with respect to natality, it remains, on the whole, unchanged, because there are still in existence the economic, social and cultural conditions conducive to the predominance of traditions of having many children in the family, i.e., the outdated social structure inherited from the epoch of colonialism characterized by widespread vestiges of archaic productive relations, by the absolute prevalence of the poor, illiterate peasant population clinging to religious prejudices, by the lack of rights for women, by the absence of any social guarantees for old people and so on. In such conditions, children constitute an economic necessity for the overwhelming majority of families and this finds its reflection in the dominant religions and customs.

20. Of course, the modern developing countries implement economic and cultural construction on a wide scale; and in the course of this construction, as the demographic experience of the developed countries has shown, the material and psychological pre-conditions for a gradual decline of natality will consolidate. Thus, the demographic changes currently taking place in the developing countries represent a temporary stage in the transition of those countries from the pre-industrial type of population reproduction, with its high natality and high mortality, to the type of population reproduction that is prevalent in the industrially developed countries, with its low natality and low mortality. The duration of this stage will depend upon many interdependent factors, including the pace of industrialization and urbanization and the dynamics of the level of living; the successes in the field of public health, social security and the emancipation of women; and so on. It should be borne in mind, however, that, while a decline in mortality immediately follows the raising of sanitary culture and the improvement of public health, change in family life, religious outlook and the traditions of having many children in the family is a slow process, as a rule; and for that reason, the rate of population growth may remain high for a long time to come.

21. However, a high rate of population increase, in conditions of persisting slow development of the agrarian economy, causes certain difficulties of national economic significance, which, in the final analysis, find their reflection in insufficiently high tempos of economic development. For that reason, more and more Governments of the developing countries are including in the complex of their national economic measures a special policy with a view to slowing down the rate of population increase through limitation of births.

22. In appraising the practical possibilities of such a policy, which usually has the official name of the

POPULATION POLICY AND DEVELOPMENT: A SUMMARY VIEW *

Frank W. Notestein **

1. The task of presenting a brief summary view of problems of policy related to population and development must be welcomed, because it compels concentration on essentials. When that is done, it turns out that a subject which at first appears impossibly complicated becomes, in its basic principles, quite simple.

2. One may begin such a summary with a few elementary value-premises for population policy.

3. The world has a great many people in relation to its current economic product. Every society, given a realistic choice, will choose more economic product *per capita* if its wealth is reasonably distributed. The world's people are at best little interested in population growth *per se*. It is a planner's abstraction. But everywhere they express no slightest ambiguity about wanting to be more prosperous. No one with compassion can face the tragic poverty prevalent in most of the world without feeling the urgent need for great increases in material well-being, especially among the poorest peoples. The first premise, therefore, is that population policies must be geared to fostering the processes of economic development and the more equitable distribution of income. Moreover, no population policy can be a substitute for economic development. Poverty can only be cured by enhanced production.

4. The fund of life is renewed and maintained by near balances of birth and death, of which there are two polar types: the inefficient one, based on very high birth rates cancelled by very high death rates; and the efficient one, based on low birth and death rates. If these two combinations exhausted the possibilities, there can be no doubt as to which combination people would universally choose for themselves. In all normal circumstances, given a realistic choice, people prefer health and survival to sickness and death.

5. The polar combinations of high birth and death rates or low birth and death rates do not exhaust the options. The choice, however, is limited. High death rates chronically coupled with low birth rates lead to extinction, and high birth rates coupled indefinitely with low death rates are impossible in a finite world. In principle, high birth rates can be coupled with an epoch of low death rates to be followed by an epoch of high death rates. However, a systematic policy of seeking longevity now, at the cost of short life later, appears a particularly vicious means of visiting the sins of the fathers on the children of the coming generations. It surely is not something that the world seeks to do as a matter of principle.

6. Pursuing this line of thought, one must quickly come to the second premise, that the ultimate goal of the world's population policy must be to achieve an equilibrium based on low birth and death rates that can be sustained throughout a distant future for the world and its several parts.

7. The fact that a demographic equilibrium based on low birth and death rates is the option that all the world would ultimately choose for itself if it could, does not mean that it is immediately either necessary or desirable. Therefore, the third premise is that policies supporting population growth, or its necessary concomitants, must find their justification as desirable way-stations on the path to stability, health and prosperity.

8. The foregoing premises do not incorporate the only, or even the most important, human values. However, these values are among the most universal, and their attainment would require fulfilling other universal wants, such as the need for education. Certainly all people would put the right of political freedom, to philosophical and religious beliefs of one's choosing, and to opportunities to pursue a life of personal fulfilment on still higher planes. None of these, however, need come into conflict with the universally wanted equilibrium of healthy prosperity. They would not, that is given the essential condition for policy formulation at the international level, namely that no one is free to advocate for others policies that in similar circumstances he would not be willing to accept for himself and his family.

9. In the light of these goals, one may ask what can be said about the costs and benefits of population growth. Clearly, there are cases in which growth is needed to provide a large enough population to reap the economies of large-scale production. But most countries that need a larger trading area to provide the economies of scale could attain it much more rapidly by lowering the barriers to international trade than by waiting for their populations to grow, however fast. It is possible for a country to be too sparsely settled to be efficient, but there are not very many such cases,

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and the existence of empty space does not provide the proof. There is usually a reason for low density, such as the limited nature of the resources, the vagaries or severities of the climate, the prevalence of disease, the displacement of labour by machines and the lack of political stability or of communications with the outside world. It would be well if Governments could face the fact that there are a great many places and conditions in which people simply do not want to live.

10. In some instances, however, areas have been kept relatively empty for reasons that modern technology and the control of disease have made irrelevant. In these circumstances, rapid growth may be needed. It is a fair indication that more rapid growth is needed in a region when its wage rates are high in terms of the national average, and when the stream of internal migration is moving in that direction already. All too often, the empty spaces which are said to need more population prove, on closer inspection, to have wages that are lower than the national average and to be experiencing a net outward movement of people. In such instances, "too little" population really means too little population to provide owners with opportunities for efficient exploitation.

11. The need for larger numbers is often urged on non-economic grounds. It is necessary for national power or simply as a matter of prestige. Surely there never was an age when such reasoning should have less force. The world has always been led by the people with superior technology; and it was never more true than in the atomic age, when the world can be ruined, but cannot be ruled, by aggression. Nor would one think much attention would be given to population size as a matter of prestige. Quite clearly, many of the world's small healthy and wealthy nations draw more admiration and exert more influence than countries many times their size. One only has to think of the countries of Western Europe, Canada, Australia and New Zealand to realize how little either power or influence turns on issues of population size. In short, the number of cases in which a rational argument can be made that larger numbers are needed is very small.

12. A much stronger case can be made that the world needs smaller rather than larger numbers. This case does not rest as much on the paucity of resources as is often thought. *Good land is in short supply, but* recent history has shown that capital and skill can be fairly effective substitutes. One hears a great deal of talk about nearing the end of economic growth because of a shortage of resources and of mounting pollution, yet it appears that *the world has never been so close* to being able to obtain a supply of basic resources beyond the imaginings of all previous generations, due to the prospects for virtually unlimited energy from the nuclear sources.[1] With an almost unlimited supply of cheap energy, vast supplies of low-grade minerals become potentially available for use and recycling. It appears that modern science and technology have the capacity to bring the world's production of both food and manufactured goods to levels about which the world has, as yet, scarcely dreamed.

13. Nor do the risks of pollution negate this potentiality. The problems are serious, but they do not [illegible] as much in the nature of technology as in faults [illegible] *nomic arrangements*, whereby the polluter and his [illegible] duct do not bear the social costs of the [illegible]. Obviously, it will be expensive to clean up, [illegible] expense is one that a truly prosperous world [illegible] afford. Man may well be at the beginning, [illegible] at the end, of economic growth.

14. It is to be earnestly hoped that this is [illegible] ning, because it is poverty that is the great [illegible] poverty so abject that the future takes a [illegible] [illegible] present poverty [illegible]

[illegible]

15. The [illegible] are great, [illegible] grim. The [illegible] of high density [illegible] tive [illegible] are clear. In the less [illegible] tries, population densities often [illegible] that simple patterns of production [illegible] guarantee crushing poverty [illegible] those of mounting complexity [illegible] poverty. [illegible] modern [illegible] productive, but *they are* [illegible] to be [illegible] to distinguish [illegible] there is ample room [illegible] [illegible] the risks are [illegible] developed countries, [illegible] population live close to [illegible] complexity [illegible] during [illegible] Complex [illegible] with high [illegible] already [illegible] would be [illegible]

16. [illegible]

[1] A. M. Weinberg and R. P. Hammond, "[illegible] of energy", *American Scientist*, vol. LVIII, No. [illegible] 1970), pp. 412-418.

would be sufficiently disorganizing to set back the entire developmental process.

17. Even in those cases in which one can imagine that population growth might be stopped immediately by drastic declines in fertility, it is doubtful that such a development would be desirable. In almost all of the countries, the higher birth rates of the past have left populations with rather large proportions of youth. As these large numbers of youth move into the child-bearing ages, even if they bear only enough children to replace themselves, there will be many more births than deaths. Indeed, as Frejka [2] and others have shown, if fertility were to fall to the replacement level immediately, it would take more than 75 years to bring population growth to a complete halt in most countries.

18. A sufficiently sharp reduction of fertility to stop growth immediately would require, in the case of the United States of America, for example, a reduction of childbearing to an average of almost one child per family. If that level of reproduction were attained and sustained for some years, the large classes now in the reproductive years would move on to swell the ages of high mortality, and be replaced in the reproductive years by the greatly reduced birth classes. Then death rates would rise and birth rates fall to produce rather drastic population declines and a population with a very high average age. Such drastic swings would almost certainly bring a reversal of public policy designed to stop population decline. It is a poor policy that contains so visibly the seeds of its own reversal. It would be fortunate if most of the world's countries had smaller populations; but this conclusion is almost irrelevant, because there is no acceptable means of reaching that objective in the near future.

19. One inference flows immediately from the fact that population growth is virtually inevitable, unless death ruthlessly intervenes. This is that economic development is essential not only to alleviate the poverty of the existing population, but to meet the pressing needs of the larger populations that the future is bound to bring.

20. It appears quite impossible to reduce populations in the near future or even to bring growth to a quick end. But it should be possible to reduce the extremely high rates of population growth that characterize particularly the most poverty-stricken of the less developed countries. Today, most of them are growing more rapidly than ever before in their history. The rates range from almost 2 to about 3.5 per cent per annum. The continuation of such rates would double the populations in between 20 and 30 years, or before the survivors of last year's births have come close to the end of their own childbearing.

21. Many learned discussions have developed about the economic consequences of such growth. The issue appears quite straightforward. The less developed countries are bearing the enormous costs of modernizing their educational systems, their methods of disease control, their agricultural production, their manufacturing equipment, their transport and their civil services. It is unfortunate that they have to carry, at the same time, the burden of the most rapid population increases of their histories. With technology in transition, it is bound to be difficult, at best, to find productive roles for all of the population, but the problems are vastly more complicated when the stream of entering workers doubles in size every two or three decades.

22. The nexus of problems centred on the expansion of the food supply is particularly difficult. The less developed countries of dense settlement need to triple their food supply by the end of the century to improve the diet of populations that are expected to be twice their current size by that time. Agricultural specialists appear to believe that it is technically possible for the "green revolution" to achieve that goal if all goes well. But such gains can only be made by a high degree of modernization, which depends upon inputs other than conventional labour. In short, in order to produce the amount of food required, substantially smaller proportions of the labour force can be used in agriculture. There may well be massive flights from the land, of which the current trek to the city is only the beginning. The resulting train of unemployment and underemployment in urban squalor may well threaten the maintenance of political coherence, with its attendant risk of disorder and death from sweeping starvation and disease. This agricultural displacement appears to carry the most serious threat to the welfare of the next decades. The cure lies in part in the use of labor-intensive methods, but still more in the development of non-agricultural industry with all its heavy requirements for training and capital investment. Rapid agricultural and non-agricultural development may well be essential to avoid the most serious of human tragedies in the next decades.

23. The danger is grave indeed that the less developed countries, faced with this spectacular growth, will continue to see, in the future as they have in the past, large proportions of the developmental effort absorbed in meeting the minimum requirements of growing numbers, rather than in contributing to the enrichment of life. It appears self-evident that these problems would be simplified by a reduction of the rate of population increase.

24. There is coming to be very general agreement with this view that the rate of population growth needs to be reduced, particularly in the less developed countries. The main objection one hears now is that other things are more important. Of course they are. One must protect the living before giving heed to the future. But this is precisely the viciousness of rapid population growth in this setting. Today's needs are so pressing

[2] T. Frejka, "The prospects for a stationary world population", *Scientific American*, vol. CCXXVIII, No. 3 (March 1973), pp. 15-21; *idem*, *The Future of Population Growth: Alternative Paths to Equilibrium* (New York, John Wiley and Sons, 1973).

that mankind can scarcely look ahead. It is difficult to escape the conclusion that the problems of economic development would be greatly simplified if the rate of population growth could be cut by a drastic reduction of fertility in the less developed countries.

25. The problems of the more developed countries are much less severe. Their fertility is already quite low, often close to, and sometimes below, the level required for the long-run maintenance of a stationary population Their populations are large and are close [illegible]

[illegible] in a situation that is in equilibrium with the environment.

26. What, then, are the possible means by which the world may achieve lower birth rates, and what are their several advantages and costs? The answers to these questions have brought about vigorous and, it appears, almost meaningless debate in recent years among the advocates of economic development, social change, and family planning The debate is unnecessary because, if one thing is more obvious than another, it is that all three are required and that no one is a substitute for the other.

27. Part of the disagreement turns on the fact that the precise role of each factor in bringing about the modern decline of fertility is not known. In today's more developed countries, birth rates are from one third to one half as high as they were at the opening of the nineteenth century. It is known that the decline *is not related to changes in reproductive capacity.* If anything, that has improved as fevers and debilitating diseases have come progressively under control. Instead, it is evident everywhere that the means by which the reductions were brought about were some combination of changes in the age at marriage and in the proportion married, increases in the prevalence and effectiveness of contraceptive practice *and increases in* the prevalence of abortion. In short, the decline of the birth rates came by means of voluntary control on the [illegible] d they [illegible] of all [illegible] h rates fell, because the citizens had come to want fewer children.

28 There is no single clear pattern of the factors that brought about this desire for fewer children. *Indeed, Coale*[3] *and his colleagues have shown that* probably different combinations of circumstances brought about the desire to restrict childbearing in different places. In general, however, fertility has declined under the multiple impact of improving health, urban-industrial development, universal education and the rising status of women. In some cases, however, birth rates have failed to fall after most of these factors have been present to some degree for a considerable time. In other cases, they have fallen when most of the factors were absent, even, indeed, where people were *wholly rural, mainly illiterate and far from healthy.* It is impossible to avoid the conclusion, however, that the most favourable context for a rapid decline in fertility is that of rapid and widespread modernization. It is impressive, also, that no population that has *reduced its fertility substantially below the pre-modern* level has ever returned to that level. The downward trend, when well launched, has been universally irreversible.

29 What then is the meaning of all this for programmes to reduce fertility? The first conclusion is clear There is an additional reason for fostering social-economic development. It is essential to alleviate the poverty of existing populations and to provide for the larger numbers which the future will almost inevitably bring *But it is necessary also to foster the motivation* for reduced childbearing, which will be needed if efforts at modernization are not to be frittered away in support of ever larger numbers living in poverty. There seems [illegible] diate problems in which its parochial interests are sharply involved Perhaps demographers, who led the way in calling attention to the importance of development in the transformation of value structures, have paid little attention to economic development as a *specific population policy on the simple grounds that* if development is not undertaken for itself, it will not be undertaken because it should help to reduce birth rates.

30. There is every reason to believe that strong family planning programmes can help slow the rate of population growth. It is sometimes urged that programmes designed to spread contraceptive practice are *irrelevant where the large-family system remains intact* and parents want more rather than fewer children. This interpretation is too simple. There is a wide diversity of values in every society. The predominance of the traditional system does not preclude the presence of the *emerging system in some degree.* The problem is to support the new values that are centred on fewer *children to whom better opportunities for health,* education and prosperity can be given. One way to foster the new values is to make it possible for those already motivated to limit their childbearing as simply and effectively as possible, thereby gaining [illegible] *examples of the merits of the smaller family.* It is [illegible] that values mediate behaviour, but it is also true that behaviour mediates values, as any observer of [illegible] in dress must agree. Probably there is no more [illegible] means of communicating the small-family [illegible] to support the efforts of those already [illegible]

[3] A J Coale, "The demographic transition", *International Population Conference 1973* (Liège, International Union for the Scientific Study of Population, 1973), vol 1, pp. 53-72, P Demeny, 'Early fertility decline in Austria-Hungary: a lesson in demographic transition", *Daedalus*, vol. XCVII, No 2 (*spring 1968*), *pp. 502-521.*

making contraception simple, attractive and inexpensive to practice.

31. In addition, serious educational programmes are needed. Such programmes should draw upon as wide a range of legitimating authority as the medical, religious and governmental leaders can supply. The essential message, however, has nothing to do with national population. It should be concentrated on the advantages, in the modern world, of smaller families to both children and parents and on the nature of services available for their attainment. Such work should not be thought of as a substitute for programmes in the fields of health and education, which are so clearly a part of the modernizing process and which are desirable in their own right. Moreover, since the wanted innovation can be used as an excellent carrier for those that are needed but less well understood, it is often desirable to combine family planning with the maternal and child health services.

32. It is sometimes argued that, since the birth rates of the more developed countries came down in response to social-economic development without benefit of modern contraception or family planning programmes, the efficient procedure would be to get on with development and stop wasting resources on family planning. The reasoning might be valid if a choice had to be made between one or the other, but it does not. A competent family planning programme should not cost more than a tiny proportion of any reasonable developmental budget. Jones [4] has shown, in the case of one expensive and effective programme, that if all the funds used to support the family planning effort were shifted to education, it would not add one week to the school year. Those who advocate withholding help in the contraceptive field, in order to concentrate on elements thought to enhance the motivation for restriction, never seem to face the unreality of the implicit proposition that birth rates will fall as rapidly if the population must rely on crude and often dangerous folk methods of restriction as they will if modern information and supplies are readily available.

33. This is not the place to review the evidence on the effectiveness of family planning programmes, but any student of the experience of Hong Kong, the Republic of Korea and Singapore must be impressed by the effectiveness of their programmes. If it is argued that the real answer lies in their economic development, the reply must be that, of course, that has been an important factor. The downward trend of the birth rate is clearly a joint product. If it is urged that India and Pakistan have had long-standing programmes of family planning without conspicuous success, the reply is that the programmes were not really serious until about 10 years ago, and that in parts of those countries having scores of millions of people, birth rates have fallen substantially. The evidence is there for anyone to read. If solutions to the problems of rapid growth are to be found, they will be found in integrated programmes of health, education, social-economic development and family planning. There are no acceptable single solutions.

34. In one sense, one object of such efforts is social change, change relating mainly to the heightened importance of the nuclear family and the individual. It is on these grounds that some people have advocated direct measures to change the structure of incentives. Clearly, one possible way is to change the minimum age of marriage. It would be highly useful provided there is a reasonable possibility that new minimums could be enforced. Other proposals suggest fiscal penalties for the parents of many children, or more realistically, fiscal rewards to those who limit their reproduction. But again, there is no simple solution. Great care would have to be taken that systems of penalties do not focus on the welfare of the children, and that complicated incentive schemes could be economically and efficiently administered. In general, one is impressed with the fact that economically weak Governments can do something to serve, something to educate and something to lead; but they can do very little to coerce, so far as human reproduction is concerned. It appears that the road of education, services and voluntarism is likely to be much the most efficient, as well as the most civilized.

35. If the foregoing analysis is correct, mankind is in a fortunate position. The most efficient policies and programmes for the less developed countries are also the most efficient for all the world's nations. There is much need for stronger programmes of economic development, health and education for all the world's people, as well as strong programmes in family planning, designed to help all peoples regulate their childbearing as they see fit. With this combination, there is a chance that population can ultimately be brought into a stable equilibrium of healthy prosperity for all the world's people. Without it, the future looks chaotic.

[4] G. W. Jones, "Effect of population change on the attainment of educational goals in the developing countries", in National Academy of Sciences, *Rapid Population Growth, Consequences and Policy Implications* (Baltimore, Maryland, Johns Hopkins Press, 1971), p. 356.

RECHERCHE D'UN ÉQUILIBRE ENTRE LA POPULATION ET LE DÉVELOPPEMENT *

Alfred Sauvy **

1. Pendant des millénaires, l'équilibre des populations, dans leur milieu naturel, n'a été assuré que par des catastrophes, famines, épidémies et guerres ou massacres. Pendant quelque temps, la population augmentait, grâce à son pouvoir multiplicateur naturel et à des circonstances atmosphériques favorables, jusqu'au moment où, par suite d'événements fatals ou fortuits, la *surmortalité la ramenait en arrière*, à un niveau compatible avec les ressources naturelles et avec la technique permettant de les exploiter.

2. Cet équilibre naturel est d'autant moins acceptable aujourd'hui qu'en raison des techniques antimortelles de masse, le pouvoir multiplicateur de l'espèce humaine a beaucoup augmenté, permettant le doublement de la population en moins d'une génération.

3. Il s'agit donc de trouver un moyen rationnel, conforme à l'intérêt des hommes, de concilier au mieux l'évolution de la population et les besoins économiques

Objectif économique

4. Dans tous les pays du monde, les hommes souhaitent avoir un niveau de vie plus élevé, c'est-à-dire consommer chacun davantage Les gouvernements prennent tous pour objectif économique l'accroissement de la *production et de la consommation par habitant*. La politique proprement économique consiste, en tous pays, à réaliser des investissements productifs, à mieux exploiter les ressources naturelles, à instruire et à former les travailleurs

5. Un autre objectif, non moins universel, vise à donner du travail, un emploi, à toute personne en âge de travail et désirant travailler.

6. N'étant pas identiques, ces deux objectifs peuvent appeler des solutions différentes. La divergence est cependant beaucoup moins grande qu'on le croit communément. *En tout cas, dans l'impossibilité d'entrer ici* dans le vif du sujet, en raison de sa complexité, nous nous bornerons à prendre pour objectif économique l'augmentation de la production de richesses par habitant.

7. Dès l'instant que la population figure au dénominateur, la réalisation de l'objectif implique que la production (numérateur) augmente plus que la population. L'évolution de la population peut donc jouer dans un sens ou dans l'autre, selon que l'influence du numérateur ou du dénominateur est plus grande.

Objectif en matière de population

8. Faut-il se proposer un objectif de population en soi, par exemple le nombre le plus élevé possible, ou au contraire la croissance la plus faible possible? Nous ne savons nullement, a priori, si ces solutions permettront d'atteindre *l'objectif économique* Pendant longtemps, les gouvernements ont considéré comme un bien en soi l'augmentation de la population, soit que ce résultat fût la preuve d'une situation économique favorable (en économie de subsistance), soit que le souci de puissance militaire ou de prestige les ait inspirés

9. Nous laisserons entièrement de côté de telles *préoccupations et nous supposerons que l'objectif*, en matière de population, doit être subordonné à l'objectif économique, tel qu'il a été défini précédemment.

Recherche de l'évolution de la population la plus favorable

10 Dès l'instant que l'objectif économique est *prioritaire, deux questions se posent . premièrement*, quelle est l'évolution de la population la plus souhaitable? deuxièmement, comment cette évolution souhaitable peut-elle être atteinte?

11. La première question est d'ordre technique, la seconde concerne la politique. Il est possible, en effet, sinon probable, que les attitudes, les comportements *des habitants conduisent à une évolution de la* population moins favorable qu'on pourrait le souhaiter. Dans ce cas, le gouvernement, doit, toujours dans notre hypothèse, essayer d'obtenir une modification de ces comportements.

Possibilité de situations très différentes

12. Pour bien nous faire comprendre, prenons deux cas extrêmes, opposés : d'une part, un pays disposant de vastes ressources naturelles et ayant quelque difficulté à les exploiter et à utiliser les meilleures techniques possibles à cet effet, peut souhaiter une augmentation du nombre des hommes, permettant une meilleure division du travail et réduisant l'intensité des transports nécessaires. Si, en outre, les habitants ont

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ı d'enfants, par exemple moins de deux par ménage, qui entraîne une diminution et un vieillissement de population, le gouvernement s'efforcera de provoquer relèvement de la natalité ou une immigration per-ınente, ou bien les deux. A l'inverse, dans un pays s fortement peuplé, disposant de peu de terres ıbles, de peu d'eau et de faibles ressources naturelles, la population est pauvre, sous-alimentée et en sous-ploi, et où les ménages ont beaucoup d'enfants, le ıvernement cherchera les moyens de favoriser une ısse de natalité, ainsi que l'émigration, si celle-ci est ssible.

13. Les deux cas se présentent aujourd'hui dans le ınde, mais le second est le plus fréquent et concerne ; pays de grande dimension. Des situations intermé-.ires, plus complexes, existent également.

développement économique peut être continu et régulier

14. Le mécanisme décrit plus haut (notamment estissements et exploitation des ressources nouvelles) ıt être continu. Depuis la guerre, de grands progrès : été faits dans la connaissance du sujet et des for-ıles assez simples ont été proposées. Contentons-nous rappeler que le développement est une évolution ıtinue qui peut, assurément, s'accélérer ou se ralentir on les circonstances, mais qui ne comporte qu'une iable, fonction du temps.

15. Certes, la production nationale est hétérogène peut être décomposée de diverses façons (notamment ısommation et équipement). Mais nous nous limi-ıns, pour simplifier, à une seule dimension.

volution de la population est irrégulière et complexe

16. Par contre, la population est une fonction à sieurs variables. Raisonner simplement sur le nom-ı des hommes, c'est négliger tout le mécanisme de olution par âge.

17. Laissons de côté les migrations qui, théorique-nt, permettent d'assurer toute évolution par âge. Le ıngement de l'évolution d'une population se fait par roduction de générations successives. Chaque géné-ion se propage, tout en vieillissant, pendant environ siècle. Par exemple, une réduction subite de la :alité se traduit, au début, par une réduction de la pulation jeune, économiquement inactive. C'est seu-ıent au bout de 15 ou 20 ans que la diminution se : sentir, sur la population en âge d'activité. Et cette luction se poursuit alors, irrévocablement, même si natalité a repris son niveau initial, ainsi que les ectifs jeunes.

18. Si étonnant que ce soit, nombreux sont les au-ırs qui oublient ou ignorent ce mécanisme et raison-ıt seulement en nombre d'hommes. Il en résulte ıvent des erreurs importantes, notamment dans les ıdèles scientifiques présentés sur le sujet.

et économique d'un recul brusque de la fécondité

19. La diminution de la fécondité entraîne, pendant ou 20 ans, une diminution des charges nationales, mais elle ne donne aucune indication sur les résultats durables.

20. Nombreux sont les modèles qui comparent le coût et l'élevage de l'enfant et celui des moyens contraceptifs propres à empêcher sa naissance. Si élevée que puisse être la disproportion, elle est dépourvue de signification. Elle conduit d'ailleurs à considérer comme indésirable toute naissance en tout pays, puisqu'une boîte de pilules se compte en dollars et l'élevage d'un enfant en milliers de dollars.

21. Ce qu'il faut connaître, c'est quelle sera la production réalisée plus tard par l'individu supplémentaire, au cours de sa vie ou, plus exactement, de combien la production nationale aura augmenté du fait de son existence. Si cet individu doit être sans emploi ou ne peut avoir qu'une activité très peu productrice, la réponse est nette : la venue de cet homme supplémentaire appauvrit la population; encore faut-il s'en assurer.

Apport de l'individu à la société

22. Si, au cours de son existence, l'individu supplémentaire produit, au total, plus qu'il n'a consommé, il rapporte quelque chose à la société et n'est donc pas à proprement parler, un indésirable.

23. Appelons $P(a)$ la production de l'individu à l'âge a (ou, plus exactement l'augmentation de production nationale obtenue par l'existence d'un individu d'âge a), $C(a)$ la consommation de l'individu à l'âge a. Le bilan final de son passage dans la société est

$$B = \int_0^\omega P(a) - C(a)\, da$$

24. Nous négligeons ici, la question, souvent discutée, du taux d'intérêt. Elle n'est pas essentielle, car les périodes où la consommation est supérieure à la production sont aux deux extrémités de la vie, de sorte qu'une certaine compensation s'établit.

25. Cependant, le fait que B soit positif n'est pas nécessairement un signe d'amélioration économique. Si, en effet, la consommation de l'individu supplémentaire est inférieure à la consommation moyenne par habitant, le niveau de vie moyen se trouve diminué, ce qui est contraire à notre objectif.

26. Cet apport positif, jugé insuffisant, peut cependant ouvrir une controverse : dès l'instant qu'il y a une vie supplémentaire, l'homme qui en bénéficie ne peut-il être reconnaissant à la société qui lui a donné le jour? Et comme il ne prélève rien sur le niveau de vie de ses concitoyens, quel reproche peut-il lui être fait? Une question quelque peu analogue se pose pour les immigrants venant dans un pays et se contentant de modestes ressources.

27. Cet argument de la quantité de vie doit être écarté, pour des considérations de solidarité sociale. Poussé un peu loin, il conduirait même à considérer comme évolution favorable la formation d'un sous-prolétariat exploité par le reste de la population.

28. Nous en resterons donc à l'objectif indiqué plus haut : une augmentation de la population n'est pas souhaitable, si le niveau de vie moyen est diminué du fait de cette augmentation. Il ne suffit donc pas que le bilan *B* soit positif, il faut qu'il atteigne un niveau suffisant pour ne pas diminuer la moyenne nationale. Notre objectif initial se trouve donc précisé, cette fois pour des raisons plus sociales qu'économiques

Application du principe posé

29. Il faut donner, maintenant, une précision sur le sens du mot "production". S'il ne s'agissait que de produits de consommation, la définition serait facile, mais, pour produire ces objets de consommation, il est nécessaire de produire un certain nombre d'équipements non seulement économiques, mais sociaux (hôpitaux, écoles et établissements culturels). Evaluer le coût de ces équipements pour la population supplémentaire est la partie la plus facile de ces recherches C'est même le seul élément qui se prête à un calcul relativement précis

30 Le calcul donne d'ailleurs des coûts assez élevés, tant dans un pays industriel, où les installations accumulées sont importantes et onéreuses que dans les pays agricoles relativement peuplés, où il faut trouver de nouvelles terres, aussi fertiles que les précédentes; le coût d'un homme représente plusieurs années de travail Si l'on s'en tenait à ces chiffres, l'impression se dégagerait que toute augmentation de la population appauvrit les habitants et a dû agir ainsi par le passé Or, une telle impression est contredite par de nombreux précédents historiques. On peut même observer que l'Histoire ne fournit aucun exemple notoire d'une population qui soit restée prospère, dans la constance ou la diminution du nombre de ses habitants. Il faut donc voir un peu au-delà des formules simples, peut-être trop suggestives.

FACTEURS MORAUX ET SOCIOLOGIQUES

31. Nous touchons ici un point très délicat . La plupart des modèles portant sur la population et le développement laissent de côté les facteurs moraux et, en particulier, les réactions des hommes devant les difficultés qu'ils rencontrent Les modèles sont construits, en quelque sorte, comme s'il s'agissait d'une espèce animale soumise à des conditions données.

32. Mais, d'un autre côté, il est fort difficile d'introduire ces facteurs dans les modèles, tant l'arbitraire est large C'est ce qui explique le silence, à ce sujet, de la plupart des auteurs. Inspirée par un scrupule scientifique méritant, cette attitude n'en revient pas moins à remplacer l'inconnue par zéro, ce qui est une méthode scientifique bien discutable.

33. Devant cette grave difficulté, en apparence insoluble, nous avons cependant un guide, c'est l'expérience. Elle est certes difficile à utiliser, mais cependant, les résultats en matière de développement économique sont généralement plus favorables que ceux que semblent dicter l'augmentation de la population et les cha[illegible] qu'elle entraîne

34. Il a été souvent dit que si l'humanité primi[illegible] s'était trouvée devant une abondance suffisante [illegible] ressources naturelles, sans augmentation du nombre [illegible] hommes, elle aurait peut-être moins souffert de [illegible] lences et de privations, mais serait encore au stade [illegible] la cueillette, avec une vie moyenne de 25 ans Pour [illegible] venir à la révolution néolothique, et à l'habitude de [illegible] courber sur la terre, il a fallu souffrir Ces consi[illegible] rations ne doivent pas être prises pour une théo[illegible] philosophique exaltant les vertus de la souffrance Il [illegible] s'agit, pour le moment, que d'observer les hommes [illegible] les choses tels qu'ils sont

35 Dans l'impossibilité d'analyser ici les nombr[illegible] événements historiques qui éclairent la question, n[illegible] pouvons tout au moins invoquer les événements [illegible] dernières années

36 Dans les pays développés, plusieurs prévisi[illegible] pessimistes ont été appuyées sur des excédents de po[illegible] lation (Japon, Italie, Pays-Bas) ou sur une augm[illegible] tation excessive de la population (République fédér[illegible] d'Allemagne, Autriche) Ces prévisions, en appare[illegible] fort logiques et conformes aux modèles scientifiq[illegible] ont toutes été démenties par les faits C'est que [illegible] réaction des hommes devant les difficultés avait [illegible] oubliée ou fortement sous-estimée

annoncée En particulier, en 1951, un comité d'expe[illegible] des Nations Unies avait fixé un minimum vital d'inv[illegible] tissement à réaliser pour l'ensemble de ces pays. B[illegible] que les sommes effectivement consacrées aux invest[illegible] sements aient été inférieures de moitié à celles [illegible] avaient été considérées comme indispensables, le nive[illegible] de vie n'a pas baissé dans l'ensemble

OBSERVATION STATISTIQUE PORTANT SUR 12 ANS

38 Pour juger expérimentalement, nous av[illegible] systématiquement comparé, pour l'ensemble des p[illegible] peu développés, l'accroissement de la population [illegible] celui du produit intérieur brut à prix constants.

39. Les données ont été prises dans la série [illegible] publications de l'Organisation de coopération et [illegible] développement économiques intitulée *Comptes nat[illegible] naux des pays moins développés* Afin d'éviter le risq[illegible] d'une sélection inconsciente, nous avons consid[illegible] l'ensemble des pays peu développés. Ont été cepend[illegible] écartés de la liste de l'Organisation de coopération et [illegible] développement économiques, la Libye dont les résult[illegible] exceptionnels sont dus à la découverte du pétrole, [illegible] Rhodésie qui compte une population blanche et é[illegible] luée, les colonies portugaises, Israel qui ne [illegible] considéré comme pays peu [illegible] pé, la [illegible] du Viet-Nam dont la situa [illegible] iment [illegible] et les pays européens autr [illegible] quie

de ces pays ne changerait d'ailleurs pas les résultats, ils ne toucheraient que la seconde décimale du coefficient de corrélation. Nous avons ainsi 50 pays peu développés :

ACCROISSEMENT DE LA POPULATION ET DU PRODUIT NATIONAL PAR HABITANT, À PRIX CONSTANTS, DANS LES PAYS PEU DÉVELOPPÉS DE 1959-1961 À 1969-1971

(Pourcentage par an)

	Population	*Produit national par habitant*ᵃ		*Population*	*Produit national par habitant*ᵃ
Algérie	2,9	−0,5	Malaisie	2,7	3,1
Angola	1,9	3,4	Malawi	2,5	0,9
Antilles Néerlandaises	1,4	0,9	Maroc	2,9	1,4
Argentine	1,5	2,6	Mexique	3,0	3,9
Birmanie	2,1	1,7	Mozambique	1,5	4,2
Bolivie	2,6	3,0	Nicaragua	3,5	3,5
Brésil	2,8	3,1	Ouganda	2,7	1,8
Chili	2,4	2,1	Pakistan	2,7	2,2
Colombie	3,2	1,9	Panama	3,0	4,7
Costa Rica	3,3	3,1	Paraguay	3,1	1,0
Egypte	2,5	2,4	Pérou	3,1	1,0
El Salvador	3,7	1,9	République arabe syrienne	3,3	3,1
Equateur	3,4	1,8	République de Corée	2,4	6,7
Ethiopie	1,9	2,5	République Dominicaine	3,0	1,0
Ghana	3,0	−0,1	République-Unie de Tanzanie	2,6	2,2
Guatemala	3,1	2,1	Soudan	2,8	0,7
Haïti	2,0	−0,9	Sri Lanka	2,4	2,1
Honduras	3,4	1,6	Thaïlande	2,7	5,2
Inde	2,2	1,5	Trinité-et-Tobago	2,1	1,7
Indonésie	2,6	0,6	Tunisie	2,2	2,2
Irak	3,2	2,4	Turquie	2,5	3,2
Iran	2,9	6,1	Uruguay	1,3	−0,2
Jamaïque	1,6	3,3	Venezuela	3,5	1,9
Jordanie	3,3	3,0	Zaïre	3,0	3,6
Kénya	3,4	2,4	Zambie	2,9	3,1

ᵃ En francs de valeur constante.

40. Les observations portent sur la période 1959/1961 à 1969/1971

41. Si nous nous en rapportions aux enseignements des modèles et aussi aux jugements couramment formulés, nous devrions nous attendre à une corrélation fortement négative. Or le coefficient de corrélation est positif (+0,11). Sur une figure où la population est en abscisse et le produit intérieur brut par habitant en ordonnée, nous devrions avoir une ligne de points décroissants. Or le nuage n'a aucune forme.

42. Faisons le calcul autrement : Dans les 25 pays, où la croissance démographique a été la plus faible, l'accroissement moyen du produit intérieur brut par habitant, à prix constants est de 2,26 p. 100 par an. Pour les 26 pays à croissance démographique plus rapide, l'accroissement du produit intérieur brut par habitant à prix constants a été de 2,50 p. 100.

43. Nous avons fait deux calculs analogues sur les 35 pays peu développés dont les résultats figurent dans le *Bulletin mensuel de statistique* des Nations Unies, la première fois sur 33 pays de 1959 à 1968, la deuxième fois sur 35 pays de 1959 à 1969; le coefficient de corrélation avait été de +0,11 et de — 0,12 par suite négligeable.

44. Sans prétendre tirer des conclusions de cause à effet, d'après des différences aussi faibles, nous constatons que, jusqu'ici, l'évolution des pays peu développés n'a pas suivi le cours pessimiste que lui imposent les théories et les modèles. A tout le moins, peut-on dire que le facteur population n'a pas été le facteur essentiel du développement.

45. Sans doute, si l'on faisait un calcul général de tous les pays, développés ou non, trouverait-on un résultat différent, puisque les pays développés ont une faible croissance démographique et une forte augmentation du produit intérieur brut par habitant. Mais ce calcul serait sans portée, puisque les pays développés ont aussi les capitaux, l'expérience, les techniciens que n'ont pas les autres.

46. L'erreur commise par la plupart des auteurs est qu'ils n'ont pas fait entrer, dans leurs modèles, les facteurs humains.

Un exemple

47. Ce qu'on a appelé "la révolution verte" est une manifestation, parmi d'autres, de ces réactions. Sans les difficultés alimentaires, l'effort en vue de trouver des semences à haut rendement aurait été moins vigoureux. Il faut évoquer aussi, bien qu'elle soit moins

visible, l'ingéniosité des individus et des ménages eux-mêmes en de nombreux pays.

48. Cependant la réaction devant les difficultés n'est pas toujours positive et favorable, aussi bien sur le plan individuel que collectif; il peut arriver, en effet, que de trop grandes difficultés entraînent la résignation et le découragement.

49 En sens inverse, on peut craindre un relâchement d'efforts résultant d'une diminution de la population et surtout du vieillissement qui accompagne toujours une telle diminution. Ce point est presque toujours négligé, bien que, dans ce domaine aussi, des précédents historiques peuvent être invoqués

Difficulté de méthode

50. Parvenus à ce point, nous nous trouvons devant une sérieuse difficulté de méthode : en négligeant les facteurs humains, nous sommes certains de commettre une erreur et nous connaissons son sens, mais nous ne pouvons les introduire, faute de pouvoir les mesurer. En leur attribuant une valeur déterminée, nous risquons de commettre une erreur, sans connaître cette fois son sens

51. En l'absence d'une véritable solution scientifique, nous ne pouvons que recommander de ne jamais oublier les facteurs humains et de les étudier, dans les cas concrets, dans un esprit de parfaite neutralité.

52. D'autre part, les résultats ci-dessus portant sur la période 1959-1961 à 1969-1971 prouvent le pessimisme excessif des prévisions et des modèles, non l'existence d'une véritable loi, valable pour l'avenir.

Schéma d'une évolution idéale

53. C'est dans cet esprit et après de longues recherches et réflexions que nous formulons des jugements, sans pouvoir les appuyer sur une véritable démonstration scientifique

54. Il est d'abord assez logique de préconiser une population stable, au sens démographique du mot, c'est-à-dire conservant toujours la même répartition proportionnelle par âge. Tout changement d'une telle répartition entraîne en effet, des perturbations et des coûts.

55 Il reste encore à savoir si une telle population doit être croissante, stationnaire ou décroissante. L'idée d'une population stationnaire a été préconisée avec insistance depuis quelques années, une telle population ne subirait en effet aucune charge d'investissements démographiques. Elle pourrait dès lors consacrer ses efforts au renouvellement des installations anciennes et à des investissements économiques propres à relever le niveau de vie.

56 Nous pensons cependant qu'une légère augmentation de la population stimulera suffisamment le progrès de la technique pour compenser sa propre charge. En outre divers ajustements professionnels ou géographiques se font plus facilement dans la croissance de la population que dans sa constance.

57 Quand nous parlons de progrès continu de la technique, nous entendons bien entendu un progrès durable, qui ne soit pas obtenu au détriment des ressources naturelles mais qui soit propre au contraire à les ménager et à en tirer parti. Ce point mérite une attention spéciale

Protection des ressources naturelles

58 Ce problème, passé au premier plan de l'actualité, est trop souvent résolu de façon sommaire, sans examen suffisant, toute augmentation de la population étant jugée contraire à la protection de la nature

59 Il s'agit, en fait, d'un problème très ancien, sous certaines formes, du moins du point de vue de la conservation du sol Les populations disposant d'une grande abondance de terres les ont souvent gaspillées ou détruites et agissent encore ainsi Les populations denses ont, au contraire, déployé, le plus souvent, des efforts pour conserver leur sol

60 Toutes les données disponibles montrent que le développement économique est bien plus responsable de la pollution de l'atmosphère et des mers que l'accroissement du nombre des hommes. C'est dans le sens d'un développement économique mieux orienté, comportant moins de gaspillages et de destructions que la solution doit être cherchée Les recherches techniques doivent être orientées en conséquence

Comment approcher l'évolution idéale

61 Admettre que la solution la plus favorable au développement économique soit une légère progression de la population, celle-ci conservant la même répartition par âge n'est qu'une vue théorique La situation initiale se présente très rarement de cette façon. Il y a donc lieu de juger comment la population doit évoluer pour se rapprocher le plus possible de la situation appropriée

62 Nous pouvons examiner divers cas

a) La population initiale est très loin de la forme stable désirée;

b) La population initiale est très inférieure au niveau nécessaire à une exploitation convenable des ressources naturelles;

c) La population initiale dépasse déjà les possibilités des ressources naturelles et a, notamment une densité excessive;

d) La population n'a pas une densité excessive, mais croît a un rythme rapide supérieur à celui qui a été jugé le plus favorable.

63. D'autres distorsions initiales peuvent se présenter, mais nous nous limitons à celles qui apparaissent le plus souvent.

Population éloignée de la forme stable

64. C'est là un inconvénient mineur, puisqu'une constance des taux de fécondité conduit à peu près à

la stabilité. Il suffirait donc que la fécondité, si elle est excessive, soit ramenée au niveau correspondant à l'accroissement de population désiré.

65. Nous n'entendons pas, dans cet article, décrire les moyens d'obtenir dans un pays, une diminution de la fécondité. Cette question a fait l'objet de longues études, sans recevoir encore de solution satisfaisante, mais selon les cas, l'effort déployé dans cette direction doit être plus ou moins intense.

Population initiale très basse

66. Ce cas est le plus facile à résoudre. Il convient cependant de se demander quel est le rythme de croissance le plus souhaitable. Un rythme rapide permet de parvenir plus rapidement à peupler convenablement les pays, mais il présente deux inconvénients : d'une part, il nécessite une grande quantité d'investissements démographiques qui peuvent retarder le développement économique, d'autre part, il obligera tôt ou tard à freiner de façon assez brusque l'accroissement de la population ce qui aura des effets perturbateurs sur la répartition par âge. Un rythme optimal est à rechercher, qui sera réduit progressivement, le moment venu.

Population initiale trop élevée

67. C'est le cas le plus fréquent et le plus difficile; il concerne souvent des pays de grande dimension. Si, par exemple, la population de l'Inde se trouvait brusquement réduite à 350 millions au lieu de 550 millions, la réduction portant également sur tous les âges, et toutes les catégories sociales, le bilan économique par habitant serait sans doute largement positif. Mais, même si un calcul sérieux pouvait être produit dans ce sens, sa portée pratique serait fort réduite, puisque le seul moyen, admis ou possible, de provoquer cette diminution est une diminution de la natalité. Une suppression totale de toute naissance pendant 12 ans, réduirait de 200 millions la population, mais en admettant même qu'elle soit concevable, elle entraînerait des ruptures de la structure par âges, très dommageables et de longue durée.

68. D'ailleurs, dans ces pays, l'objectif ne porte pas tant sur la longue durée que sur l'immédiat. Il s'agit d'obtenir une diminution de la natalité aussi élevée que possible; comme le résultat est toujours inférieur aux nécessités, le souci de voir plus loin se borne à une prévision assise sur les résultats obtenus. A ce stade, il n'est plus guère question d'optimum de population, mais de maximum de réussite d'un programme de limitation des naissances.

69. Si des moyens antinatals très efficaces étaient trouvés, le conflit se poserait, toujours en termes économiques, entre le désir d'une stabilisation ou d'une diminution du nombre total à bref délai et le souci de réduire les perturbations de la composition par âges. Le compromis entre ces deux objectifs est assez difficile à déterminer, mais cependant un calcul économique n'est pas inconcevable.

Conclusion

70. Nous devons nous défier d'autant plus des lois et des formules générales que l'indépendance des nations et la faible solidarité économique internationale posent presque autant de problèmes que de pays. Nous manquons plus d'études nationales profondes que de modèles généraux. C'est dans cette voie que devraient s'orienter les recherches.

THE INTERRELATIONSHIPS BETWEEN DEVELOPMENT AND POPULATION IN THE DEVELOPING COUNTRIES *

G. A. Pavlov **

1. The analysis of various demographic trends in the modern world gives reason to assume that they reflect a transition from the traditional primitive type of population reproduction which is characterized by high indexes of fertility and mortality, to a new, more economical type notable for its low mortality and relatively low, in comparison with the past, fertility levels.

2. The formation of the new type of population reproduction should not be regarded as a simple change in parameters. The pattern of population reproduction is determined by social and economic factors, i.e., in the long run by the sum total of the productive forces and the relations of production, and its modifications are the result of social changes which entail in their turn consequences of a social nature.

3 The first step in the new type of population reproduction was a decline in mortality. Whereas towards the close of the eighteenth century, the mean life expectancy in the European countries stood at 30, by the end of the nineteenth century, the mean life expectancy in the majority of the European and some of the non-European countries already exceeded 40 and in a few countries even 50 years. Afterwards, the drop in mortality became ever more pronounced so that by now life expectancy in the industrially developed countries has reached a very high level of 70 years and over.

4 Progress in medical science has played a tremendous role in the decrease of mortality. However, it would not suffice to say that such a rapid decline in mortality has become possible due to the success in medicine The development of productive forces has made it a necessity. Growth of large-scale machine production led to the emergence of densely populated industrial centres, big cities whose population would have died out from epidemics if not for the establishment of social control over morbidity and mortality. On the other hand, the rapid evolution of engineering has enhanced the economic value of man The low professional qualification of a worker (especially unskilled women and children widely used in the early stages of industrial capitalism) has turned into an obstacle in the way of technical progress. A considerable rise in the mean life expectancy in the age bracket [illegible] effect of the accumulation, transfer and utilization of production experience and knowledge. It is evident that without a reduction in mortality the modern system of general education and vocational training could hardly have been attained, let alone the up-to-date professional standards of workers, which clearly demonstrate the development level of productive forces in the age of scientific and technological revolution.

5 The decrease in mortality also caused very important demographic repercussions. It became possible to impose deliberate restrictions on the number of children in a family; at the current level of mortality the birth of from two to three children is equal to the birth of from five to seven children at the high mortality level peculiar to the primitive type of population reproduction. The decrease in fertility in the developing countries was not instigated from without but [illegible] origin in the very essence of the family.

6. The decline in fertility brings to its [illegible] the rationalization of the population reproduction [illegible] cess and makes it far more economical. [illegible] the first time in history, does the [illegible] opportunity of performing her [illegible] at an incomparably lower cost to her [illegible] health. Great amounts of social [illegible] which were previously dissipated [illegible] way. This serves as one of the [illegible] the true social emancipation of [illegible] participation in the public [illegible] of her culture and [illegible] process of population [illegible] new status of [illegible] children's education [illegible] a higher level and [illegible] opment of the [illegible] of the [illegible] fessional [illegible]

7. The [illegible] graphic [illegible] and [illegible] and cannot be [illegible] However the under-

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lying principle refers to the qualitative modifications of the living conditions and the public attitude, which are determined by the level of production development and the resulting economic and social progress.

8. The transition from one type of population reproduction to another, naturally, does not occur simultaneously in all countries. In different historical conditions, it assumes varying trends, with the specific features of the demographic transition in a given country bearing its own particular significance. For instance, the abolition of social inequality in the Union of Soviet Socialist Republics, together with a fast growth of the socialist economy, laid the foundation for a speedy and universal mortality decrease. The rapidly developing economy provided the growing population with the necessary conditions for production and with the means of subsistence.

9. This transitional period in the developing countries is characterized by a sharp decline in mortality and by a steady high level of fertility in a majority of countries.

10. The joint achievements of mankind in its combat with death could not bypass the developing countries. Notwithstanding their grave lack of resources, one of the top-priority measures for these countries after their liberation from the colonial oppression was, as a matter of fact, a vast application of highly effective and comparatively inexpensive medical preparations (such as vaccines, antibiotics and disinfectants), in combination with improved sanitary conditions and certain other preventive measures, that would essentially reduce, within a comparatively short period of time, morbidity and mortality, caused by contagious diseases.

11. The quick, impressive effect achieved in this case by relatively cheap ways can be explained by the fact that, formerly, these countries did not carry out even the simplest precautionary measures against epidemics.

12. One should note that in very many cases mention is made only of the initial stage of the transitional period. The high rates of survival typical of the developed countries have not yet been attained by the enormous masses of population in many developing countries. There exist vast reserves in these countries for a further decline of mortality, as well as the urgent need for it.

13. A decrease in mortality, as a rule, is conducive to a certain rise in fertility. It is accounted for by the improved health of the population and the reduced share of physiologically sterile married couples, as well as the decreased amount of marriages ended by the early death of one of the spouses. Therefore, it is no wonder that in countries still in the primary stage of the transitional period, fertility indexes are maintained at a traditionally high level or climb even higher.

14. In an attempt at reducing fertility, Governments of many developing countries are spending heavily on various "family planning" programmes. Nevertheless, these huge efforts produce but very vague results. The approach of the second transitional stage can be expedited only to a slight extent through the use of multiform stimulating measures and will not occur before the population reaches a certain level of economic, social and cultural development.

15. Traditional views in favour of large families with many children, formed against the background of high mortality, were later reinforced by religious dogma and made an integral part of the ethic systems predominant among the majority of countries. The large-family concept became a target in itself. Being in use over a lengthy period of time, the practice as such was converted into tradition.

16. The current trend towards small families with few children in many economically developed countries should be associated with the change in public life and beliefs, whereas the emergence of modern contraceptives as the mainstay in family planning programmes is just the consequence of the ever-growing requirement for these devices.

17. The prevailing views with regard to the formation and life of the family are subject to a strong traditional influence and their alteration is to be attributed to the change of generations rather than to the modification of these views within the same generation over a length of time. It can be supposed that man's principal ideas of the structure and functions of the family and procreation are formed at an age of 20-25 and remain almost unchanged throughout his lifetime. Therefore, it is evident that the decisive significance in determining the fertility level of a given generation is ascribed not so much to the conditions of a period that corresponds to the period of the maximum fertility as to the socio-economic conditions in which the formation of the view of this generation took place. It should be kept in mind that opinions and traditions themselves often retain their strength even after the social and economic conditions which created them have already changed. Consequently, the substitution of a new type of population reproduction pattern for an old one, where it concerns a change in fertility patterns, cannot take place overnight but progresses gradually over a period of several generations.

18. It is because of these circumstances that different interpretations of the same demographic surveys crop up in developing countries.

19. Those research workers, who concentrate their attention mainly on the practice of introducing modern contraceptive methods and on the study of their use by the population, consider that universal propaganda and distribution of new contraceptive devices may suffice to produce tangible results in reduced fertility. On the other hand, those who adhere to the reproduction theory and base their research on the data of the "ideal", "desirable" and "expected" number of children in the family come to the conclusion that no substantial

changes occur in the traditional bias for a bigger family with more children.

20. Currently, in reviewing the question of possible future changes in the size and rate of growth of population for an area or a country, principal concern is given to the question of changes in the pattern of population reproduction on time basis As a rule, main attention is directed to possible changes in fertility, with inadequate regard for the "initial" structure of population formed at the commencement of the period under review as the result of all the past history. Nevertheless, the "initial" population structure represents no less important factor of the population growth than any possible time-based changes in the parameters of the population reproduction pattern.

21. In many developing countries, the population structure has a large "demographic" potential In considering this notion, one may adduce a conditional example bearing no claim to the role of a real forecast. Taking as the "initial" parameters the strength and structure of population that would conform to the United Nations estimates for North Africa in the beginning of 1965 and maintaining that the current population reproduction pattern in this area would remain unchanged (*e_0°, 50 years; with a gross reproduction* rate (GRR), 3.2, i e. very close to the "initial" parameters according to the "medium" variant),[1] it can be predicted that by 2000 the population will increase 2.7 *times: from* 74.5 *million to* 200 *million.*

22. Assuming that a decrease in mortality and fertility by 2000 would result in a population reproduction pattern satisfying the parameters, e_0°, 70, GRR, 2.7, *the population would still increase* 2 7 times, from 74.5 million to 198 million.

23. Yet, in assuming that by 2000 a "stationary" population reproduction pattern would be established (that is, a theoretically zero population growth would exist; e_0°, 70; GRR, 1.1), the population would increase 2.1 times, and thereafter would treble by 2075 (74 5 million to 221 5 million), if such a pattern were *perpetuated Lastly, even if this "stationary" pattern* were to have been in effect from 1965, by 2000 the population would increase 1.6 times, to 116 million

24. Even if those figures be treated differently, one thing is clear: *the population presents a social problem* determined by the socio-economic development in the past and present; its successful solution depends upon the social and economic development in the future.

25. A real change in the sphere of social and economic development in the developing countries can be secured on the condition of a decisive and consistent implementation of profound social and economic reforms intended to remove barriers that hinder development of the productive forces and to promote the strengthening of national sovereignty and the protection of natural resources in the interests of national development.

26 The development of the national economy and, principally, the establishment of domestic industries, progressive reconstruction of agriculture, abolition of illiteracy and uplifting of educational level, training of skilled national personnel, improvement of the cultural level of the population, granting of equal rights to women and their full enrolment in the economic, cultural and political activities—this is the main approach to the solution of present-day problems, including demographic ones, in the developing countries.

27 Removal in some developing countries of temporary difficulties caused by the rapid population growth is possible only on the basis of national economic development and cultural growth. The principal prerequisite of the accumulation of means to stimulate an upsurge in the economy and in culture, augmentation of national income and the struggle against hunger and poverty, will be the fastest, most complete and rational utilization of material and labour resources.

28 The majority of the developing countries with [illegible]

conditions even at high rates of population growth.

29 The important condition for successful completion of high-priority tasks is the introduction of economic and social planning. The example, provided [illegible]

essentially in the way it is applied to the social and economic structure and national features of individual countries Mutual co-operation between developing countries is of great importance for the achievement of their individual targets The significance of all-round use of national resources and reciprocal co-operation towards the attainment of high rates of economic development is graphically demonstrated by the example of the Soviet Union and other socialist countries which *have reached, within the shortest historical period,* economic independence and a high level of development.

30. The demographic policy in this or that country should be adopted independently by its government proceeding from the country's specific conditions and enjoying the support of a wide public It should never be imposed from outside Any method of influencing the population growth rate must be *applied in strict* observance of the principles of humanity and respect for the rights and dignity of man. For all this, one must allow for the fact that pursuance of such a policy *in isolation cannot prove effective unless one takes into* account the evolution of objective factors.

[1] *World Population Prospects Assessed in 1968* (United Nations publication, Sales No 72.XIII 4), p 29 and annex I, table 4 4.

[2] Here, as in all subsequent estimates, allowance is made for the exponential change in age-specific mortality and fertility.

31. The experience of economic development in the USSR, as well as in other socialist countries, shows that radical socio-economic changes which are most efficiently carried out in the countries with planned economies and non-existent contradictions between the development of productive forces and the way of distribution of national wealth, result in the overcoming of economic backwardness, the raising of the general economic level, an increase in labour productivity and the promotion of the cultural and educational standards of the population. The rapid growth of public production in the USSR requires permanent involvement of new contingents of labour force into the national economy, ensuring full employment of all the able-bodied population. All these processes permit the successful solution of problems involved in improving the well-being of working people at a high rate of population growth.

32. No problem of disparity between the growth of the economy and the population growth arises in the USSR. The rates of economic development in the country currently exceed the rates of population growth. At the same time, the Soviet State is much concerned with the increase of the country's population. It proceeds from the assumption that the growing population, in the conditions of socialist economy, represents one of the major factors in the steady growth of public wealth and the welfare of all the members of the society.

33. In pre-revolutionary Russia and during the early years of Soviet power, the economy was, in fact, similar in many ways to the economy of the currently developing countries, with fertility and mortality even higher than is the case now in the majority of these countries. As the result of the enormous agrarian overpopulation and of an insufficient standard of dev l-opment of the productive forces, there was considerable unemployment in the USSR during the first years of Soviet power. The extremely grave situation was even more aggravated by the devastation inflicted by the First World War, the civil war and the armed intervention of imperialist States. As compared with 1913, the gross national product, national income and number of industrial and office workers employed in the national economy in 1922 decreased twofold; the gross industrial output fell 40 per cent; gross agricultural output, 70 per cent; and the labour productivity in industry and agriculture dropped by 30 per cent.

34. After the termination of the civil war and the restoration of the pre-war economic level, the country embarked upon a course of the industrialization of the people's economy, collectivization of agriculture, accomplishment of a true cultural revolution. These tasks were fulfilled in an exceptionally brief period of time.

35. The peaceful construction was interrupted by the attack unleashed by Nazi Germany against the Soviet Union. During the war, with the added hardships of occupation of a number of areas by the fascist invaders, the national economy of the USSR was reorganized on a military footing and continued supplying the front with all necessities.

36. During the years of the Second World War, great damage was sustained by the national economy of the Soviet Union. The gravest loss suffered in the war was the toll of more than 20 million Soviet people killed. Especially heavy losses were inflicted on groups of the population who had in their mass received general education and vocational training under the Soviet power and were thus chosen to play an active part in the social and economic construction not only in wartime, but in the subsequent years. Despite the heavy sacrifices, the population of the Soviet Union, according to the census of 1959, surpassed the population of 1939 by over 18 million.

37. The USSR has now completed the construction of a full-fledged socialist society. The Soviet Union is one of the most economically advanced countries in the world.

38. By the beginning of 1972, the population in the Soviet Union had increased by 67.8 million, or 38 per cent, as compared with 1950, and is now approaching 250 million.

39. The gross national product of the USSR increased more than fivefold during the years 1951-1971. The most rapid growth rates were shown by industry whose output increased 7.4 times. Simultaneously, agricultural output has grown considerably throughout this period (2.3 times). The growth of agriculture by far exceeded the increase in population. This resulted in a rise in the *per capita* agricultural production (1.7 times). Over the period 1950-1971, the total volume of the national income rose 5.6 times, that is 4.1 times in *per capita* terms.

40. Capital construction is carried out on a vast scale, housing conditions and the system of cultural and communal services to the population are improved, the state system of health protection is widely enlarged, the organization of public labour is constantly ameliorated and the labour resources are utilized to an ever greater extent.

41. The social and economic development has exerted direct influence on the change in the population reproduction pattern, which is affirmed by the data in the table given below.

42. The main social and economic causes affecting the fertility levels are industrialization and related factors, such as a rise in migration and the growth of urban population at the expense of rural communities, the growth of cultural standards, the concession to women of equal rights in political, cultural and economic fields and an increase in the number of women engaged in public production.

43. The large-scale industrialization of the country accompanied by construction of a great number of new industrial enterprises has been followed by an intensive process of formation of new towns, development and

DYNAMICS OF PRINCIPAL INDEXES OF POPULATION REPRODUCTION IN PRE-REVOLUTIONARY RUSSIA AND THE UNION OF SOVIET SOCIALIST REPUBLICS

Years	*Crude birth rate*[a] *(per thousand)*	*Crude mortality rate*[a] *(per thousand)*	*Infant mortality rate*[a] *(per thousand)*	*Gross reproduction rate*	*Net reproduction rate*	*Mean life expectancy (both sexes)*
1896-1897	49 7[b c]	32 4[b]	260[b]			32[b]
1913	45 5	29 1	269			
1926-1927	44 0	20 3	174	2 610	1 680	44
1938-1939	36.5	17.3	167	2 138	1.438	47
1950	26.7	9 7	81			
1958-1959	25 0	7.6	41	1 365	1 262	69
1964-1965	18 4	7 3	27	1 196	1.134	70
1970-1971	17.8	8 2	23	1 200	1 147	70

[a] General rates refer to the last year of the two-year period
[b] For 50 *guberniyas* (provinces) of the European part of tsarist Russia.
[c] Mean value for the years 1893-1897.

expansion of old towns and rapid increase in the urban population.

44. Over the past 20 years, there has been an average annual increase of over 3 million in the urban population.

45 In 1950, the urban population constituted 39 per cent of the total; in 1970, it reached 56 per cent, and 58 per cent in 1972

46. The growth of the urban population was followed by the intensification of its concentration in large cities. The total number of cities with populations of from 100,000 to 500,000 rose from 128 in 1959 to 197 in 1972 and the number of cities with a population of over 500,000 rose from 25 to 34, including 11 cities with a population of over 1 million

47. In the years between the censuses of 1959 and 1970, the urban population grew by 36 million. The increase in the urban population was due to the natural growth of population in the towns, which amounted to 14 6 million over a period of 11 years, and is explained by the fact that a number of rural localities with a population of 5 million were transformed into towns. Over 16 million rural inhabitants moved from the countryside to the urban-type communities.

48 The migration of rural population to the urban areas was necessitated by a considerable growth in industrial production. It became possible because of the increased level of mechanization and labour productivity in socialist agriculture.

49. The educational level of women in the Soviet Union constantly rises. The number of women with secondary and higher education grows faster than in that of men. In 1972, as against 1959, the number of women with higher education rose from 20 to 41 per 1,000 women aged over 10, thus increasing more than twofold The number of women with complete or incomplete secondary education rose in the same period from 318 to 437 per 1,000, that is, 1.4 times. The percentage of persons with higher and complete and incomplete secondary schooling among men and women workers has become practically equal.

50 The number of women industrial and office workers in the national economy is systematically on the increase. In 1950, the number of women workers in the national economy constituted 19 2 million, or 47 per cent of the entire figure of industrial and office workers; in 1960, it grew to 29 3 million and accounted for 47 per cent, and in 1971, it became 47.3 million, or 51 per cent of the total amount.

51. The participation of women in administration and social and political activities is characterized by the fact that they comprise 62 per cent among the personnel of administrative bodies and hold many leading administrative posts.

52. No compulsory or propagandist measures meant for artificial curtailment of fertility have ever been practised in the Soviet Union The woman in the USSR is accorded the right and opportunity to solve the maternity problem of her own free will. Abortions are permitted in the Soviet Union (the operation for interruption of pregnancy is allowed only in hospitals or other medical institutions), and contraceptives are for sale in all pharmacies At the same time, maternity in the USSR has always been protected and encouraged by the State.

53. The minimum paid maternity and post-confinement leave is for 112 calendar days (56 days before and 56 after the delivery) In the event that two or more babies are born or in cases of pathologically hard labour, the post-confinement leave is extended by 14 days. During this period, the working woman receives an allowance out of social insurance funds Mothers with two children are entitled to a lump-sum grant upon the birth of their third and every subsequent child and receive a monthly allowance upon the birth of the fourth and every subsequent child.

54. For working mothers of five or more children who have brought them up to the age of eight, the pensionable age and the length of service required to become eligible for a pension are both reduced by five years.

55. The decisions of the twenty-fourth Congress of the Communist Party of the Soviet Union stipulate that,

with effect from 1974, families with low *per capita* incomes will be granted allowances for the rearing of their children.

56. The Soviet State manifests permanent concern with regard to children, their welfare and health protection. The number of nurseries and kindergartens annually increases. By the close of 1960 the pre-school institutions numbered 70,600, and by the end of 1970, 102,700 with over 9 million children in their care.

57. The budget expenditure in the Soviet Union for payment of allowances to mothers and for children's care has increased twofold over the past decade; the allotments for running general education schools of all types and boarding-schools (with the exception of schools for working urban and rural youth and secondary extra-mural schools) over the same period grew more than twofold, the expenditure for kindergartens and nurseries, 4.7 times. Apart from the state budget, the children's institutions are also financed out of the funds provided by state agencies, trade unions, co-operatives and other public organizations, as well as collective farms.

58. It does not follow, of course, that under socialism there arise no demographic problems (such as the problem of manpower deficiency in some areas of the country). Similar and other problems are solved along the guidelines provided by the main target of socialism—the all-round augmentation of material welfare and an increase in the cultural standards of the Soviet people on a planned basis.

DEMOGRAPHIC ASPECTS OF DEVELOPMENT PLANNING *

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1. In this paper, an examination is made of the population question as it affects the process of planning and development in Nigeria. The paper is divided into five main sections. The first presents, very briefly, the available statistical data on the Nigerian population and its estimated rate of growth The second section

graphic problem In the fourth section, an alternative, probably more realistic approach to the problem is indicated. The Nigerian situation is then analysed in the light of this alternative approach. Lastly, resulting from this analysis, an examination is made of the salient features of Nigeria population development and the main thrusts of public policy in the country. Any serious effort at economic planning and socio-economic development concerns people and the satisfaction of their needs over time and space. Since Nigeria is the most populous country in Africa, its experience in the field of demographic influence on national planning and social development should be of great interest in a comparative study. This is the more so when it is realized that in terms of a potential resource base, Nigeria is one of the most serious economic propositions in Africa.

STATISTICAL DATA

2. There have, in the past, been some difficulties in the estimation of the absolute level and rate of growth of the population in Nigeria. Available statistical information in this area is based on the censuses conducted in 1952 and 1963 A summary of the results is presented in table 1.

3. Table 1 shows very high population growth rates over the 11-year period, varying from 4.7 per cent in Mid-western to 9 8 per cent at Lagos. In the aggregate, a compound rate of growth of 5.6 per cent per annum is implied by the figures This is admittedly a very high

TABLE 1 NIGERIA POPULATION, 1952 AND 1963

State	*1952 Census*	*1963 Census*	*Growth rate (percentage)*
	(millions)		
Northern states	16 8	29 8	5 3
Eastern states	7 2	12.4	5.1
Western state	4 4	9 5	7.3
Mid-western state	1 5	2 5	4 7
Lagos state	0 5	1 4	9 8
Total	30 4	55 6	5 6

figure compared with recorded population growth rates in other developing countries. Consequently, there is genuine concern in various circles that the figures for the two years are not strictly comparable. It has been suggested that there must have been a substantial undercount in 1952, especially since the purpose of population censuses was not properly understood by the bulk of the population who, more often than not, linked the census count with the tax effort of the former colonial administration Others have suggested that, even after allowing for possible undercount in 1952, there is reason to believe that the figures for 1963 are on the high side.

4. These doubts and uncertainties have made it necessary to carry out further sample studies and analysis with a view to deriving an appropriate growth rate for purposes of development planning In the end, a growth rate of 2.5 per cent to 2.7 per cent per annum was postulated by the Nigerian planners This growth rate formed the bases of both the First National Development plan, 1962-1968, and the current Second National Development Plan, 1970-1974.

5. One of the social projects in the current plan is the conduct of a national census scheduled for November 1973. This census is one of the reform measures of the new military administration in Nigeria, whose aim is to organize the count without the sectional rivalry and political bitterness of the 1963 count. The result is expected to provide firmer statistical data on the Nigerian population.

6. Apart from the absolute level and growth rate of population, planners are also interested in [illegible] and sex composition. A [illegible]
data for 1963 is given in

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TABLE 2. AGE AND SEX COMPOSITION OF THE NIGERIAN POPULATION, 1963

Age group	Male	Female	Total	Percentage
0-14	12.4	11.4	23.8	42.8
15-59	14.6	15.3	29.9	53.8
60+	1.1	0.8	1.9	3.4
Total	28.1	27.5	55.6	100.0

7. Table 2 shows that the Nigerian population is about equally distributed between the two sexes. Furthermore, a little more than 50 per cent of the population is included in the age group 15-59, which can be roughly regarded as the working age group. These figures do not give cause for concern and are similar to the situation in other developing countries. The official retirement age in the public sector is 55 years.

IMPACT OF DEMOGRAPHIC FACTORS ON DEVELOPMENT PLANNING: NIGERIAN EXPERIENCE

8. The problem of population growth has received serious attention from economists since the time of Malthus, who was the first significant writer to draw attention to the possible dangers arising from uncontrolled population growth. More recently, the rapid growth of population in some developing countries has resuscitated the concern of development planners and policy-makers. To the unemployed and the unemployable school-leaver, the ghost of Malthus is not a phantom, but a real personal experience.

9. In any serious planning exercise, the development planners must take into account the level, structure and rate of growth of the population. These variables have a great impact on the crucial decisions to be made in the formulation and execution of development programmes. A few examples will suffice to illustrate the point.

10. The first point is the obvious, that the socially necessary rate of growth in any plan period must be related, among other things, to the rate of growth of population. If the growth rate of income is less than the growth rate of population, *per capita* income or the average level of living, will, of necessity, be seen to fall and this is socially and politically unacceptable. If both income and population grow at the same rate, *per capita* income will be maintained at the same level. *Per capita* income, the common though inaccurate, indicator of economic and social progress, will only rise if the growth rate of income exceeds the growth rate of population. Since a development plan must, at the very minimum, maintain an already achieved level of *per capita* income, it is clear that population growth sets a floor to a socially acceptable minimum rate of growth over a plan period. Thus, if the population grows at 2 per cent per annum, no Government will plan for an income growth rate of less than 2 per cent. In the Nigerian context, the assumed rate of growth of population in the 1962-1968 and 1970-1974 development plans was 2.5 per cent per annum. Taking this as a floor, the planned minimum growth rates of output under the two plans were 4.0 per cent and 6.6 per cent, respectively. This implies a growth rate of *per capita* income of 1.5 per cent and 4.1 per cent under the two plans. In this way, the demographic factor can be said to have contributed to the determination of the minimum growth rate under the plan.

11. Secondly, the rate of growth of the population helps to determine the minimum level of employment which must be created during a given plan period. It is usually assumed that the rate of growth of the labour force is roughly equal to the rate of growth of the population. Having derived the absolute increase in the labour force in this way, planners should direct their policies towards ensuring that at least enough employment opportunities shall be created to absorb the increase and, if possible, to reduce the existing backlog of unemployment. This problem was not treated quantitatively in the 1962-1968 plan. But in the 1970-1974 plan, the labour force, growing at nearly the same rate as the population, was expected to grow from 26,080,000 to 28,560,000, an increase of about 2,500,000. Taking this as a floor for employment creation, the planners postulated an increase of 3,300,000 in gainful employment—from 24,050,000 to 27,310,000. This performance would make it possible to absorb the whole increase in the labour force and to reduce the backlog of unemployment from 2,000,000 to 1,250,000 by the end of the plan period.

12. Thirdly, population growth is one of the determinants of the magnitude of investment under a plan. This is due to its influence on the required growth rate of income and on required employment creation. Next to be examined is the income side. Given the required rate of income growth consistent with the estimated population growth rate, reasonable assumptions about the capital-output ratio determine the necessary level of investment. In the 1962-1968 plan, the income growth rate of 4 per cent and assumed capital-output ratio of 3.75:1 implied an investment ratio of 15 per cent of the gross domestic product which came to 1,183.3 million Nigerian pounds (£N) over the plan period. In the 1970-1974 plan, the planned growth rate of 8 per cent at current prices and assumed capital-output ratio of 2.5:1 implied an investment ratio of about 20 per cent of the gross domestic product. This amounted to £N1,596 million over the four-year plan period.

13. Turning to employment, it has been seen how the growth rate of population helps to determine the additional employment opportunities to be created under a plan. Thereafter, calculations are usually made to determine the capital-labour ratio or the amount of investment necessary to employ one unit of labour. From this estimate, the total investment required to employ the additional labour is derived. Such calculations were taken into account in arriving at the investment floor of £N1,596 million under the 1970-1974 plan.

14. Fourthly, there is the important question of consumption. *Per capita* consumption is a good indicator of the general level of living of a people If people are to put up with the sacrifices called for by rapid economic transformation, it is necessary that *per capita* consumption not be allowed to drop. This means that, over the plan period, aggregate consumption should increase at least as fast as population growth The demographic factor thus sets a floor on the growth of consumption. Given the assumed population growth rate of 2 5 per cent, the 1962-1968 plan postulated a growth rate of 3 per cent in private consumption. This ensured that *per capita* consumption would increase by at least 0.5 per cent per annum In the 1970-1974 plan, private consumption forms a fairly constant 78 per cent of the gross domestic product throughout the plan period, which implies that consumption is expected to grow at about the same rate as the gross domestic product Since the aggregate growth rate is substantially higher than the assumed population growth rate, this implied that *per capita* consumption is planned to increase substantially over the plan period. At current prices, *per capita* consumption is expected to rise by about 5 5 per cent per annum.

15. Fifthly, the demographic factor plays a crucial role in the planning process through its influence in the estimation of the gross domestic product In many developing countries, with inadequately developed statistical services, the level of the gross domestic product is in some ways largely influenced by that of the population. In other words, total population, as a raising factor, is used to determine, from results derived from very small samples, the over-all output of some commodities. An example of this in the Nigerian situation is the estimation of the output of agriculture, particularly in the category of farm crops, including oranges, pineapples, paw paw, coconuts, greens, tomatoes and plantains. *Per capita* consumption of each of these commodities is derived from urban consumer surveys, which are regularly conducted throughout the country. These *per capita* consumption figures are then multiplied by the total population to derive aggregate consumption figures When these are added to the quantities exported net of imports, total domestic output is derived. In this way, the demographic factor contributes to the estimation of national income for planning purposes.

16 Lastly, the demographic factor plays an important role in the determination of necessary expenditure in the social sector during a plan period, especially in education, health, water supplies, and housing. The demand for each of these is directly related to the size and growth rate of the population. In the Nigerian situation, residential construction is largely a private sector activity Even then, the need to build more houses to take care of the growth of population was specifically recognized by the 1970-1974 plan, which consequently provided for investment in this area to grow from £N10.5 million in 1970-1971 to £N12 million in 1973-1974. This implies a growth rate of 4.5 per cent compared with the population growth rate of 2 5 per cent A total expenditure of £N45 million was earmarked for dwellings over the plan period.

17. Education, health and water supplies are the direct responsibility of the Government. Planned expenditure in these areas under the 1962-1968 and the 1970-1974 plans was partly conditioned by the level and growth rate of the population. The relevant figures are given in table 3, the allocations in 1951-1956 being given for comparison.

TABLE 3 NIGERIA. PLANNED CAPITAL EXPENDITURE IN EDUCATION, HEALTH AND WATER SUPPLIES

(Millions of Nigerian pounds)

	1951-1956	*1962-1968*	*1970-1974*
Education	6 9	69 8	128 7
Health	5 8	17 1	46 7
Water supplies	4 6	24 3	45.5

18. These figures show a substantial increase in government capital expenditure in these sectors over time. Part of the increase in 1970-1974 is, of course, due to the need to reconstruct facilities damaged during the civil war Nevertheless, there is no doubt that a substantial part of the increased expenditure during the period 1951-1956 to 1970-1974 is accounted for by

population. Relevant quotations from the Second National Development Plan, 1970-1974, are given below to underscore the influence of the demographic factor on planned expenditure in the three sectors.

"One major focus of educational policy in Nigeria has been the ultimate provision of formal education to every child of school-going age to at least primary school level, on the ground that universal education is very vital in improving the people's receptiveness to new ideas.. Although there has been significant development in formal education over the past two decades, only a small proportion of the population has had the benefit of formal education In 1966 the primary school enrolment ratio for the nation as a whole was about 30 per cent In other words, in the primary school age group less than one child in three was in school " [1]

"A healthy population is an economic asset since the assured supply of a strong and healthy labour force is an essential factor in development. Health services must, therefore, keep pace with the growing needs and resources of the people; for if they lag far behind the whole community is bound to suffer." [2]

"Government accepts that the provision of water, which is one of the primary needs of man, is a

[1] Nigeria, *Second National Development Plan, 1970-1974* (Lagos, 1970), pp. 235-236.

[2] *Ibid*., p. 247.

service which it is obligated to perform to the citizens. During the plan period, therefore, the policy objective will be to further expand and improve both the urban and rural water supplies throughout the country. In the urban areas, the strategy will be to increase the capacity of water supply to meet the expected growth in population . . . ."[3]

These quotations with respect to education, health, and water supply are sufficient to illustrate the impact of the demographic factor on planning in these sectors.

19. Closely related to this is the whole concept of regional planning and here again the demographic factor plays a crucial role. The provision of medical, educational, water supply, and other facilities is meant to meet the requirements of human beings. Therefore, the distribution of the population is bound to affect the spatial allocation of planned capital expenditure. In the Nigerian situation, regional or physical planning is still at a rudimentary stage. Nevertheless, in distributing available resources among the various geographical areas of the country, the planners give due recognition to the demographic factor. Even the sharing of federally derived revenues among the states is partially based on the population factor.

Coping with the demographic element: a viewpoint

20. Arising out of their recognition of the elements outlined in the preceding section, some economists and policy-makers have taken strong positions on how to cope with the demographic element during the process of development planning. Partially because of the population explosion in some developing countries, it is more or less suggested that the population factor impedes development in the third world. The argument is that population growth increases the effort required to effect a given increase in the standard of living. Whether the aim is to increase *per capita* income or *per capita* consumption, to increase the enrolment ratio in schools, to provide medical services, water supplies or other facilities, or to battle with the problem of unemployment, the greater the level and growth rate of population, the more difficult the task of the planner becomes.

21. It is thus argued that in circumstances of high population growth, resources which could have been used for development are necessarily used to supply the additional members with the basic necessities of life. By reducing the growth rate of population, resources can thus be released for development. It is also argued that rapid population growth increases the dependency ratio by increasing the number of children relative to the labour force. The percentage of producers to non-producers can thus be increased by reducing the population growth rate. The additional point made is that a rapid population growth rate increases the level of illiteracy. Thus the elimination of illiteracy calls for a reduction in numbers. As for the question of unemployment, although changes in the growth rate of the population will not affect the labour force for about 15 to 20 years, it can nevertheless be argued that, taking a long-term view, reduced fertility is advantageous in countries where unemployment is a serious problem.

22. In the light of the foregoing discussion, it is suggested in some quarters that the way to cope with the demographic factor in the development process is population control. Population control is seen as the most effective way of raising incomes and generating development. Discussing the problem in the context of the Nigerian situation, D. E. Pursell concluded that:

> "The main point in this report is that economic growth in Nigeria could be accelerated by lower fertility levels. This study indicates that reduced fertility could contribute to increased income, reduce illiteracy, enable substantial improvements in human capital, increase the proportion of the labour force employed in the modern sector, and reduce the pressure on the agricultural sector to expand supply to maintain constant *per capita* food consumption... A population policy designed to curb population growth combined with public assistance could contribute much to economic development in Nigeria. Ultimately, some form of population limitation will have to be part of the development programme."[4]

This conclusion tallies with the conventional approach to the impact of the demographic element on planning and development. However, this fashionable conclusion is only one way of looking at the problem; and in the authors' view, it is a misleading approach to the Nigerian situation.

Coping with the demographic element: an alternative viewpoint

23. It scarcely needs to be pointed out that, in problems of the type being discussed, no one solution can be advocated for all countries or even for the same country at all times. Economic opportunities differ from one country to another. The growth rate of population, the character of the people, and the natural and other resources to be exploited differ. Questions, as to whether the growth rate is high or low and what remedial measures, if any, should be taken, must be discussed in the context of the circumstances of a particular country.

24. In theoretical discussions of the problem, use is made of the concept of the optimum population. When population is below the optimum, increases in population generate increased *per capita* output. On the other hand, when population is above the optimum, further increases reduce *per capita* output and income.

[3] *Ibid.*, p. 176.

[4] D. E. Pursell, *Economic Development in Nigeria under the Condition of Rapid Population Growth* (University of Ibadan, Nigerian Institute of Social and Economic Research, 1972).

What the optimum is for any country depends upon the circumstances of the country, particularly the resources with which it is endowed. This concept of the optimum population is a useful one in that it emphasizes the point made above that each case must be examined separately before a solution can be prescribed.

25. It should be added that in studying the situation in any country, a dynamic rather than static approach should be employed What matters is not merely the resources available at a given point in time It is necessary to peer into the future and take account of any prospective changes which can be identified at the moment.

26. Such assessment of the population factor in the

factor on planning and development.

THE NIGERIAN SITUATION

27. In reporting on the population situation in Nigeria, therefore, one has to determine, first of all, whether its resources by way of land area and capacity to produce food are adequate to accommodate the population now and in the near future. The place of technological revolution is very important here. Furthermore, one has to consider whether the observed trend in the values of important economic indicators shows that its capacity to accommodate additional numbers will increase or decline over time.

28. As Arthur Lewis once pointed out, space is probably more important than food in this discussion. "Accordingly the arguments about food are subsidiary to considerations of space. We may learn to make food out of hydrogen atoms and to produce it in virtually unlimited quantities. But what are we to do about space."[5] As it appears more difficult to increase the land area than to increase food supply, the former may be regarded as a more effective limitation on the capacity of a country to accommodate greater numbers. Even here, through irrigation on the one hand, and skyscrapers on the other hand, space can be created as well.

29. From this point of view, Nigeria is well placed. With a land area of 357,000 square miles and a population of about 70 million in 1972, the population density is less than 200 persons per square mile. This compares favourably with the population density in many developed and developing countries, as the following statistics show (see table 4).

30. If the countries listed in table 4 can cope with such high population density, Nigeria should be able to do so with efficient management of the economy, other things being equal in the long run.

[5] W A. Lewis, *The Theory of Economic Growth* (London, Allen and Unwin, 1963), p. 309

TABLE 4 POPULATION DENSITY, SELECTED COUNTRIES

Country	*Area (square miles)*	*Population (millions)*	*Density (per square mile)*
Belgium	11,781	9,730	826
China	3,692,000	787,180	213
France	211,209	51,301	243
Germany, Federal Republic of	95,927	61,225	639
Japan	142,811	104,660	733
India	1,261,820	550,370	435
Italy	116,306	54,803	471
Netherlands	15,770	13,194	837
United Kingdom	94,216	55,566	590

31. Though there are some parts of Nigeria, in the Owerri and Annang Districts in the east, with a density of over 1,000 persons per square mile, it is also true that there are large areas of sparsely inhabited, but fertile, territory An example is the Middle Belt, with a density of under 100 persons per square mile, which is, therefore, capable of absorbing millions of additional inhabitants. Thus, it can be said that from the point of view of space, the danger of population pressure is not yet a cause for concern in Nigeria. There may be a problem of moving people from congested zones to sparsely populated areas, but this is a problem of a different order of magnitude.

32 Turning to food supply, one finds that much the same conclusion emerges. Nigeria has a vast land area on which practically all tropical crops can be grown due to varied climatic conditions. Food crops cover a wide range and include yams, cassava, cocoyams, plantains, palm kernels, maize, millet sorghum, cow-peas, rice, vegetables, palm-oil, ground-nuts, beans, kola-nuts and fruits. According to the Second National Development Plan, more than half of the potential agricultural land of the country is currently not utilized A recent report on Nigeria, prepared by the International Bank for Reconstruction and Development, states that on the basis of estimates of the Food and Agriculture Organization of the United Nations, the area cropped is probably little more than one third of the land judged to be currently suited for agriculture and less than one fourth of that judged potentially suited for it Thus, potentially good land is still abundant.

33. Feeding the population is, therefore, not a problem. In the past, Nigeria has coped with incre [illegible]ng population mainly by extending the area under cultivation With the additional benefits of better seeds, fertilizers and insecticides, it will be long before feeding the population can constitute a serious problem. The "green revolution", involving the four basic crops of rice, maize, cassava and wheat, is yet to be launched in th[illegible] country.

34. In addition to land area and the food problem, several economic indicators show that the Nigerian economy is developing so rapidly that there should be little concern over its ability to accommodate a popu-

TABLE 5. NIGERIA: ECONOMIC INDICATORS, 1960-1961 AND 1970-1971

	1960-1961	*1970-1971*	*Increase (percentage)*
Gross domestic product (millions of £N)	1,250	1,996	60
Mineral oil production (millions of tons)	0.8	53	6,525
Value added in industry (millions of £N)	57	165	189
Exports (millions of £N)	166	439	164
Capital formation (millions of £N)	148	406	174
Government revenue (millions of £N)	137	425	210
Money supply (millions of £N)	119	304	155
Electricity consumption	432,300	1,148,000	171

lation increase of 2.5 per cent per annum. Some of the relevant data are given in table 5.

35. The phenomenal increase in the indicators given above bears ample testimony to the dynamics of the economy. Many of the indicators actually displayed even better performance in the post 1970-1971 period as the economy recovered fully from the disruptions of the civil war. For instance, mineral oil production rose from 1.2 million barrels per day in 1970-1971 to 1.9 million barrels per day in 1972 and about 2.3 million barrels per day by the end of 1973. This spectacular performance of the oil sector is reflected in other indicators, such as gross domestic product, capital formation, exports, government revenue and external reserves. With such evidence of the potentials of the economy, there is little room for doubting the capacity of the Nigerian economy to accommodate a population growth of 2.5 per cent per annum.

36. Besides, one has to take account of the non-quantifiable element, the character and quality of the people. Nigerians are generally noted for hard work and self-reliance. The average Nigerian is determined o stand on his own and make a living under the most ifficult circumstances. He is also highly adaptable to rapidly changing conditions. The additional numbers can be relied upon, therefore, to make reasonable contribution to the growth of the economy.

NIGERIAN POPULATION POLICY

37. In the light of the foregoing considerations, population control is not and should not be the policy of the Nigerian authorities. The planners believe that, given the land area of Nigeria, the agricultural potential, the character of the people, and the dynamics of the economy, there will be no problem, in the near future, of coping with the current rate of population growth. In the words of the current national plan:

> "The magnitude of the country's population problem is unlikely to be such that calls for extensive emergency or panic actions. Given the promising resource base of the economy the country can, through careful planning, succeed in buying time to ward off undue population pressure. For Nigeria, the distribution and movement of population to reflect relative economic opportunities is probably more important in the short run than the aggregate size of the country's population." [6]

38. In consonance with this view, the national population policy is not to compel or even persuade people to reduce the size of their families. Such an approach assumes that resources are fixed, but as has been shown, they are not. Instead, official policy encompasses provisions for facilities for family planning, for helping workers to acquire skills through training, for the encouragement of population mobility and for rural development.

39. In the first area, the Government is determined to make family planning facilities available to all, so that those who voluntarily wish to plan their families can do so. The plan proposes the establishment of a national population council to co-ordinate government action and voluntary activities in this direction.

40. The second element of public policy is the provision of training facilities to enable prospective employees to acquire necessary skills. It is believed that existing unemployment is not a result of over-population, but a reflection of a shortage of the type of skills required by the economy. By emphasizing technical and vocational education, the Government hopes to reduce the gravity of the problem by ensuring that the applicants shall be actually employable.

41. The third aspect of government policy is the encouragement of labour mobility. It is realized that there could be population pressure in particular areas of high density even when there is no over-all population problem. Nigerians are encouraged to be free to move to, settle in and do lawful business in any part of the country. This is part of the whole concept of national unity. In this way, the possibilities of localized population pressure will be minimized. Sometimes this policy is reflected in the establishment of farm settlements where prospective farmers are moved from congested areas to settlements established in scarcely populated parts of the country. In a society where the

[6] Nigeria, *Second National Development Plan, 1970-1974*, p. 77.

people are attached to their communal lands, this approach has its limitations in practice.

42. The fourth endeavour relates to the important problem of rural development. Much of urban unemployment, which is sometimes taken as evidence of population pressure, derives from the fact that life in the rural areas is most unattractive. The result is a continuous migration of people from the rural areas where they engage in some farming to the urban areas to join the ranks of unemployed persons. It is government policy to encourage these people to go back to the rural areas and engage in improved farming This involves a policy of general improvement of living conditions in the rural areas—provision of a good water supply, medical facilities, schools, cottage industries, rural electrification and extension facilities to farmers. It is expected that by so diminishing the gap between the rural and urban areas, rural-urban immigration could be brought under control

CONCLUSION

43. The current rate of population growth in Nigeria is postulated at 2.5 per cent per annum. This demographic factor was given full recognition in the two comprehensive National Development Plans which were formulated for the 1962-1968 and 1970-1974 development plan periods It is believed that though population growth could seriously impede the national development effort, this position has not yet been reached in Nigeria. The capacity of the economy to cope with a population growth rate of 2 5 per cent per annum is not in doubt. It is not surprising, therefore, that the Government has not accepted population control as a matter of public policy. Instead, it has adopted a four-sided policy strategy, comprising voluntary family planning, the inculcation of skills in prospective applicants, the encouragement of labour mobility and of rural development in dealing with the so-called "population question".

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36. Besides, one has to take account of the non-quantifiable element, the character and quality of the people. Nigerians are generally noted for hard work and self-reliance. The average Nigerian is determined to stand on his own and make a living under the most difficult circumstances. He is also highly adaptable to rapidly changing conditions. The additional numbers can be relied upon, therefore, to make reasonable contribution to the growth of the economy.

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[6] Nigeria, *Second National Development Plan, 1970-19* p. 77.

whole community.[5] In 1970, it authorized the Director-General to assist Members States on request in the *elaboration of population and family planning policies.*[6] In 1972, it recommended that the Director-General promote by means of education and information a clearer insight among the public into the nature, causes and consequences of demographic trends [7]

5 It can thus be seen that the relationship between population and education may be viewed from many angles and that various aspects have aroused public interest over the past 20 years Education, and the research which is behind education, can throw light on the relationship between demographic factors and the preservation of peace, and on the relationship between population dynamics and economic and social development. It can help the individual to understand his or her role as a member of a family and as a citizen influencing population policies Above all, it is concerned with the way in which population changes affect the quality of life Rapid population growth places a heavy burden on educational systems and, together with other factors, affects the conditions of their functioning, but can also lead to innovation and to the reform of those systems

6 These questions have become of such importance for developed and developing, rich and poor, countries, that demography or population studies, which were once a somewhat rarefied subject, can no longer be confined to the post-graduate level Economic and social planners, school administrators, political workers, all who lead and influence public opinion need to be aware of the basic issues In action programmes and in the formulation of population policies, as contraceptive techniques become simpler, the role of education and communication become of primary importance

7 A discussion of the relationship between population and education cannot be very meaningful unless the general objectives of the educational systems referred to are understood, whether these objectives are the conservation of traditional values or the changing of attitudes, or whether indeed the education provided is seen as an end or as a means. Before proceeding to discuss the relationship, therefore, it is necessary to take a brief look at the state of education in the world today and at the institutional problems which confront it.

Education today and tomorrow

8. The current educational scene is full of paradox. If some valid global generalizations can be made, evidence can easily be found to refute them; contradictions abound

9. More persons go to school than ever before, yet, because of population growth, more persons do not go to school than ever before. Universal primary schooling is a reality—in some countries In many more, it is only a proclaimed and distant goal. There are those who claim that breaking the stranglehold of tradition should be the main task of educationists; others argue that the current pace of educational change is too destructively rapid. Faithful pictures can be drawn of any facet of education, but they will look different depending upon whether they are viewed by someone from a developed or developing country, from a rural or urban area, male or female, rich or poor.[8]

10. Despite the mosaic of contradiction and variation, there are, however, some general characteristics and broad similarities—both positive and negative—that might be depicted These common denominators *are found essentially in the way learners are grouped* and educational systems structured, in the content and methods employed and in selection, guidance and evaluation

The growing demand for education

11 These patterns are all being pressured to change by the two most ubiquitous common characteristics of education today· the ever-increasing attention paid to it and the ever-growing demand for it and its availability on a life-long basis Education, once a sphere reserved for a few, is now a common concern of the multitude In all its forms—in school and out of school—education has become in the last decades the world's biggest industry, engaging more people and expenditure than any other human activity.

12 Reasons for this upsurge are manifold, but they can be combined into a single cause If education is not all things to all men, it has at least come to represent something for everyone In proclaiming education a human right,[9] the United Nations gave global approbation to a democratic ideal born centuries before. This basic demand for universalizing education has augmented the pressures for its realization, not only for the extension of educational opportunity to more and more children, but for an equalization of that opportunity once access to it has been gained Generalized realization of this goal awaits the future, but clamour for it is present and pressing.

13. Individuals—and Governments—have also more particular reasons for their heightened interest in education. Learning is viewed as a lever for social mobility. Diplomas are deemed necessary for richer material reward Expanding economies need ever-increasing

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[5] *Records of the General Conference of UNESCO, Fifteenth Session*, vol. II, part A, chap. II, para. 1 241.

[6] *Ibid*, *Sixteenth Session*, vol. I, part A, chap II, para. 1.21.

[7] *Ibid*, *Seventeenth Session*, vol. I, chap II, para 7 41.

[illegible] Harrap, 1972)

[9] See, for example, article 26 of the Universal Declaration of Human Rights, *Human Rights—A Compilation of International Instruments of the United Nations* (United Nations publication, Sales No E 73.XIV 2)

numbers of skilled workers, and technological change transforms traditional trades or creates entirely new job categories requiring large-scale training and retraining. The demands for economic development and the direct impact on more men and women of the increasingly complex social, economic and political processes of present-day societies add to the necessity for a knowledgeable citizenry. Lastly, with the extension of leisure in wealthy societies, many persons turn to education to make their free time bountiful instead of boring. The combination of all these interests accounts for the unparalleled expansion of education at all levels, in all its forms.

14. Student enrolment rose more rapidly in the generation after the Second World War than ever before in history. From 1950 to 1960, the number of persons attending schools and universities increased by 102 million. The rise was even more rapid during the past decade; between the years 1960 and 1968, the total number enrolled in the three main levels of education rose from about 325 million to some 460 million —an increase of 135 million or more than 40 per cent. This is 100 per cent greater than the corresponding rate of increase in the population of school attendance age, and 135 per cent higher than the world demographic increase during the period.

15. This is remarkable progress, but the satisfaction it inspires at first glance is considerably tempered by two facts. First, the absolute total of children not enrolled in schools increased still further, by 165 million (+34 per cent), that is to say by 30 million more than the additional contingent of children and adolescents receiving school education. Secondly, amalgamation of the statistics for the whole world is misleading in so far as results were much more modest than was hoped—and needed—in precisely those four regions of the world which lag furthest behind the others. In fact, during the eight years in question, the proportion of school-age children attending primary or secondary schools rose only from 24 per cent to 28 per cent in Africa, from 36 per cent to 45 per cent in Asia, from 40 per cent to 51 per cent in Latin America and from 28 per cent to 38 per cent in Arab countries. Another disturbing factor is that more recent enrolment statistics show a general trend towards a decrease in the rate of expansion, i.e., enrolments are still increasing but not as fast as from 1960 to 1965. Population growth, however, has not slowed down.

The need for reform

16. As for the future, the utlook is not encouraging. If the rates of pop wth and school enrolment were to continue ntil the year 2000 at the same rates as o cade, this would mean that, up to the tury, the number of persons having the but no material possibility of ever sett room would increase each year by an on. This, because of the decrease in mentioned above, is probably an underestimate. If there are added the existing millions of children and adults whose schooling has been nil or insufficient, then the future demands on educational facilities are evidently enormous.

17. The implications of this massive pressure must be confronted. They are basically two: expansion of educational facilities must be increased even more than in the past; and, for this, education must change radically.

18. If the social demand for educational opportunities is not fulfilled—if the existing gaps in educational provision between regions, within countries, among social classes and age groups, and between men and women, are not alleviated—the resulting tensions will inevitably lead to disastrous social, economic and political turmoil. If the demand for the economic progress of more and more people is not met by providing knowledge and skills needed for fruitful employment, the disease of under-development may become chronic. The only alternative is to meet the demand, which will require forthright political decisions, attitudinal changes in all segments of society and a transformation of present-day educational systems.

19. Governments will have to decide their essential priorities for real social and economic development. Societies will have to evaluate what their essential needs are for individual and collective enrichment. Educators will have to devise the new structures, contents and methods to supply the required education and training.

20. Education must truly become a system, not simply a school system. The latter will be a part of an over-all, integrated organization of multiform facilities for learning and training of a kind until now unused, under-developed, or unheard of. Methods will range from computer-assisted instruction to peer-teaching in primary grades. The means might be a colour television set or a hand-tool fashioned by learners themselves. "Teachers" will be mobilized from varied ranks—workshop foremen, business and professional personnel, farmers and extension advisers, retired workers—as well as from teacher training colleges and universities.

21. Most important, learning will take place at all ages, directed towards the fullest development of the infant, child, adolescent and adult—at the harmonious integration of the individual with his society and environment at all stages of life. Life-long education will focus on providing everyone with the knowledge s required not only to cope with his environ- to shape it to his wishes and needs, to work to preserve it.

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ynamics. Two other factors, often interlinked, have een involved in the third quarter of the twentieth entury. First, decolonization, which in Asia and Africa vas the most important historical feature of the period, ave a very great impetus to educational expansion. olitical leaders and officials who were accountable o their own people, instead of to a foreign régime, vere pledged to targets of universal primary and greatly xpanded secondary and higher education. Secondly, ot only in the same regions, but elsewhere, there was demand for "democratization" and expansion of ducational systems which in many parts of the world ad long appeared designed to serve the needs of an *lite* class. These two factors had much to do with the ormal establishment of enrolment targets at meetings f Ministers of Education at the regional level in the arly 1960s

23. The third factor was the rapid growth in popuation mainly due to a fall in mortality, notably infant nortality, consequent upon control of malaria and ther diseases and improved nutrition In the past few ecades, mortality has declined in the less developed ountries more rapidly than it ever had in the currently eveloped countries; but fertility has declined in the ormer (less developed countries) to a much less marked legree than it did in the latter (developed countries) vhen they experienced the corresponding fall in nortality.

24. The meeting of Asian Ministers of Education n Singapore in 1971 found that while the total number of enrolments in the age group 5-24 rose between 1960 and 1968 by 61 per cent,[10] the proportion of popuation enrolled only rose from 25 per cent to 32.3 per cent.[11] Whereas the percentage of adult illiterates n the region had fallen from 66 per cent to 58 per cent, he actual numbers of illiterates had risen from 322 million to 355 million.[12] In the same period, pupil/teacher ratios at the primary level rose from 38:1 to 40:1.[13] It was estimated that within the next 15 years there would have to be an increase of over 50 per cent in schooling facilities simply to maintain enrolment ratios at their existing level. The Ministers, in their final report, noted that:

"The targets of *enrolment ratio* envisaged in the *Karachi Plan*[14] and the *Asian Model*[15] could not be achieved—even though the *additional number* of pupils enrolled was according to the targets—because the rate of population increase turned out to be higher than what was earlier estimated. The implications of demographic growth pose a major problem for educational planning and resource availability."[16]

25. As concerns the future, according to recent estimates by the United Nations,[17] annual population growth rates for the period 1970-1985 stand at 2.7 per cent in South Asia, 1.6 per cent in East Asia, 2.9 per cent in Africa and 2.9 per cent in Latin America, as against 1 4 per cent in northern America and 0 7 per cent in Europe

26. When the anticipated increase in school-age population is examined, the magnitude of the problem presented, and the extent to which it is concentrated in the developing countries, may be seen from the following data·

SIZE OF THE POPULATION AGED 5-14

	1970	*1985* *(millions)*	*Total increase*	*Increase (percentage)*
Developed countries	194	215	21	10 8
Developing countries	642	914	272	42 4

SOURCE *UNESCO Statistical Yearbook, 1971*, table 1 2

27 Moreover, within the developing countries, the demands will be unevenly concentrated, as urban populations are currently growing by about 4 5 per cent in developing countries, as compared with 2 per cent in developed countries

28. As the effects of demographic dynamics on educational development are examined more closely, different dimensions of the problem have to be considered.

29 First, there is the quantitative dimension. In many countries, rapidly increasing numbers of young people below reproductive age have to be nourished, brought up and educated by relatively decreasing numbers of economically active persons. In those with high demographic growth rates, 50 per cent or more of the population are under the age of 20. This restructuring of the age pyramid puts a heavy strain on the capacity of a country to finance its educational services.

30 Moreover, as already stated, rapid population growth constitutes a main obstacle to attaining crucial quantitative educational targets. In establishing target figures for enrolment ratios at the primary, secondary and third level, educational planners of the early 1960s were, in fact, aiming at a moving target and unforeseen

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rs of Education and in Asia, Singapore, Education in Asia, 3, part I, para. 16

[11] *Ibid*, table 7.

[12] *Ibid*, para. 9.

[13] *Ibid*, para. 22.

[14] *A Working Plan for the Provision of Universal, Compulsory and Free Education in Asia (1960-1980)*, UNESCO Education Studies and Documents, No 41 (UNESCO publication, Sales No ED 60 XII 41/A)

[15] *An Asian Model of Educational Development· Perspectives for 1965-1980* (UNESCO publication, Sales No. ED 66/D.33/A).

[16] *Third Regional Conference of Ministers of Education and Those Responsible for Economic Planning in Asia, Singapore, 31 May to 7 June 1971. Final Report* (UNESCO document, ED/MD/20), para. 36, emphases supplied.

[17] *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No 72.XIII 4); "Estimates of urban and rural population by regions and countries, 1960-1985", *Monthly Bulletin of Statistics*, vol. XXV, No ov 1971), pp. xxiv-xiv.

population growth in the corresponding age brackets has largely outweighed the impressive progress made in terms of additional school enrolment. Looking at the future, the capacity of many countries to finance the planned expansion of their educational systems appears to depend upon whether they manage to curb a rate of population growth which considerably exceeds that upon which their plans are based.

31. In the qualitative dimension, the rapid increase in student numbers through population growth has, in many countries, left little room for the necessary upgrading of teachers, introduction of modern educational technology and provision of more and better buildings. The bulk of additionally available resources has to be spent on recruiting new teachers simply in order to prevent a deterioration of existing pupil/teacher ratios. The problem of school drop-out and retardation would also appear to be directly related to the quality crisis in education, characterized by poor teaching, irrelevant courses and learning by rote. School drop-outs are thus often casualties of uncontrolled educational expansion pushed forward by rapid population growth. Yet, here again, the demographic factor cannot be isolated from other factors in development, such as the desire of parents for child labour or their inability to provide clothes and school materials.

32. The importance of education wastage through repetition and drop-outs in many countries with rapid population growth—repetition and drop-outs which are often a result of that growth—makes a drastic reduction of wastage rate the pre-condition for the expansion of educational facilities required by the growing demand. In one country of Africa, it appears that the unit cost of the primary-school certificate is seven times higher than it would be without repetition and drop-outs from classes 1-6.

33. Population pressure, apart from its effects on qualitative and quantitative educational development, tends to curtail the contribution of education towards greater social equality. The depletion of available resources to provide basic minimum facilities to accommodate rapidly growing numbers of students entails the sacrifice of programmes to alleviate inequalities between boys and girls, between rural and urban areas, and between favoured and poorer sections of society. While lack of equal educational opportunity is an important problem in its own right, it assumes additional relevance in the light of an apparent coincidence between those who tend to be neglected by the school system and those groups which make the least attempt to reduce traditionally high fertility patterns. It is believed that this coincidence is not an accidental one; rather, it would point to the importance of education for the disadvantaged in bringing about more rational reproductive behaviour.

34. Lastly, the effects of population dynamics on education should also be seen at the family level. Research conducted in a variety of countries with different cultural contexts seems to suggest that, when combined with poverty, large family size and absence of proper child spacing hamper the development of children's cognitive, verbal and motivational capacities as well as their health and physical development. This observation is reinforced by the fact that in many instances parents in large families find it much more difficult to bear the costs of having their children educated. The combination of poor parental support, low motivation, undeveloped cognitive potential and impaired health, which is therefore likely to be found in children coming from large and impoverished families, thus tends to narrow down their educational outlook from the beginning.

35. It cannot be expected that the pressure of population on education will diminish in the near future, as even the most successful population policy involves large time-lags. On the contrary, available demographic and educational projections carried out by the United Nations and UNESCO seem to suggest that the current situation is likely to become more acute.

36. Population pressure, however, while acting as a major obstacle to balanced educational development, may also prove a positive element in bringing about long-needed educational reforms that might remain unachieved if educational systems were under less pressure. It is thus the very dialectics of development that may open up room for innovative action, using population dynamics as a crucial agent of comprehensive educational renovation.

37. Only the future can prove or disprove this view. However, answers have to be found to a basic question: what criteria and guidelines can be used as one moves towards educational reforms designed to contribute to more balanced demographic and socio-economic development? A few tentative answers to this are suggested below.

The influence of education on population dynamics

38. The effects of education on population trends are difficult to estimate because it is not easy to separate the educational factors from other variables.

39. A number of studies indicate that there is a relatively high correlation between high literacy rates and low birth rates. Correlation of the level of urbanization with fertility decline appears equally strong.

40. From the limited research which has been undertaken, it would appear that there is little or no relationship between education and fertility when the groups compared are people with no schooling and those who have up to four or six years of primary education. The level of education which probably has to be reached to reduce fertility sharply may be as high as from 10 to 14 years of schooling. Surveys that have been carried out to ascertain the ideal number of children desired generally indicate that people with a high educational level desire somewhat smaller

families than uneducated people, though the difference might be equally valid if the comparison were between rich and poor people. On the other hand, surveys in a number of countries appear to suggest that the better educated are having about the number of children they desire, while those with little or no education are having substantially more.

41. Adults who have received education usually desire education for their children, which, in many *societies, causes them to limit the size of their families* because of the direct or indirect costs of education. Education of girls very probably postpones the age of marriage The opening of new employment opportunities to girls and women also contributes to a limitation and spacing of births Educational progress, through its effects in developing and modernizing social and *political institutions, may also be considered a major* factor in the popularization and adoption of national population policies. However, there is a considerable need for further research on the relationship between education and population trends

Innovation and renovation

42. *Population education is still at an experimental* stage as an instrument of educational policy. While recognizing that considerable investigation of the effects of education within different cultural contexts is required, a few guidelines may be suggested as to other ways in which educational innovation may be able to help deal with the problems of population dynamics.

43 First of all, population processes and problems need to be viewed as different in incidence and causal [illegible] tries but between [illegible] within countries, [illegible] ds to be unevenly distributed throughout the population. Group disparities in social status, income, access to information, prevalence of traditional attitudes and values and, last but not least, provision of adequate education are often reflected in differences in reproductive behaviour. In the light of this, educational policies run the danger of being too uniform or, indeed, of leading to a type of selection that runs counter to the differentiation required if the needs of some of the crucial subgroups of the population *are to be effectively met. Educational* renovation, in order to make an impact on population dynamics, should therefore give special emphasis to hitherto underprivileged groups, such as rural youth, girls, out-of-school youth, premature school-leavers and young urban migrants.

44. Secondly, it would appear essential that programmes of educational renovation, in order to meet the population challenge, should form part of integrated development programmes. Attempts at bringing about rational and responsible reproductive behaviour through, for instance, the introduction of population education will probably not achieve the desired results where the economic situation remains backward and where social structures and cultural norms fail to stimulate change and progress A sustained decline of high fertility in countries where this is an official objective will thus hardly result from an isolated effort of educational policy. Not only does population education need to be [illegible] tion for development, can only bear fruit if properly supplemented by social and economic measures.

45. *Thirdly, it is increasingly recognized that efforts* to affect population dynamics through educational means cannot be confined within formal school systems. The formal school system, in many countries, tends to perform best where demographic issues are less acute, i e , among wealthy and middle-class people in urban areas. On the other hand, its coverage and quality *would appear less satisfactory when it deals with those* sections of society which contribute most to the process of continuous rapid population growth As stated in the report of the Second Asian Population Conference, "Hitherto, the major part of the expenditures of education had been devoted to the formal school sector, but large numbers were outside this sector. They were *important not only from the point of view of their* contribution to fertility behaviour, but also as potential contributors to the economy of the country."[18] The fact that in some countries the proportion of the gross national product or total state spending allocated to education may have reached a critical limit also points to the necessity of putting more emphasis on the educa*tional potential of agents and institutions outside the* formal school system [19] Educational reforms along this line are likely to make the contribution of education towards balanced demographic development more feasible and more relevant.

Migration: causes and effects

46. *Lastly, a major focus of educational* renovation has to be on the migration aspects of population dynamics Primary and secondary education of a conventional character are an important, possibly the most important, factor in the movement from rural to urban areas of school-leavers seeking the kind of employment and life-style which their own local environment does not offer. Migrants usually have a distinctly higher educational attainment than is typical for their departure areas. This is not to say that high attainment itself is a factor of migration, but it may become so when the kind of education given is not such as to encourage those who receive it to remain on the [illegible]

47. Increasing rural-urban migration in developing countries has led to rapid and unplanned growth of gigantic urban centres, whose population is expected to double within 15 years or so. There are many indications that this rapid influx, instead of [illegible]

[18] "Second Asian Population Conference, [illegible] Final Report" (E/CN.11/1085), chap. IV [illegible]
[19] International Commission on the Development of Education, op. cit., p. [illegible]

manpower from low-productivity agricultural activity to more productive urban employment, is shifting poverty from the country to the cities. Urbanization in such conditions does not open the way to industrialization. The quality of education, as well as the other social and infrastructural services in urban growth centres, appears to be increasingly affected by this process.

48. In particular, the type of education and training that young urban migrants would need in order to move from unskilled, casual jobs to regular skilled or semi-skilled employment are not sufficiently provided for in many of the big cities of either the less developed or the more developed countries. To the extent that urban migrants remain at the margin of society, they are not likely to give up their rural patterns of high fertility behaviour, thus perpetuating the same process of population dynamics of which they themselves are a striking manifestation. It may also be stressed that migrants tend to show considerable innovative momentum, openness and flexibility. Relevant education directed towards migrant groups in cities may be effective not only in relation to their own outlook and reproductive behaviour, but in the feedback to the rural areas which is obtained when migrants visit their villages, bringing the prestige of familiarity with metropolitan life.

49. At the same time, migration entails a steady outflow from rural areas of the younger, productive and innovative elements of the population. To what extent this exodus has been responsible for the relatively slow progress of rural economies in developing countries would appear an open question, but the difficulties and high costs of providing satisfactory education in rural areas are often caused by rural exodus and related problems, such as the reluctance of teachers to move to rural areas.

50. Those concerned with educational change and innovation in relation to population dynamics have, in fact, every reason to take the problems of rural exodus and urban overcrowding very seriously. There is increasing awareness that the underlying ideologies, aspirations and values instilled in rural youth by the conventional type of education may act as a direct stimulus for migration and undermine the objective of regionally balanced educational progress for all groups of society. In this context, the recent comment of the International Commission on the Development of Education would seem highly relevant:

"... In many societies, exodus begins at the village. Patterns of life are copied from the towns, the educational system is based on imported school models, and both show scant concern to help the individual integrate into his environment by giving him the feeling that he belongs to a nation and a society. Together with other objectively fruitful values, they inculcate values into school children which estrange them from their surroundings, feeding intellectual and material ambitions which are becoming harder and harder to realize in a rural setting. Schools thereby push young people out towards the towns, after having helped to turn them away from their own native springs of life ... ."[20]

51. New types of education, including a wider range of school and out-of-school education, as well as the adaptation of the content and organization of education in rural areas, may therefore mark the most urgent and obvious task of educational renovation in response to population dynamics. Innovative thinking and experiments are already going on in a large number of countries, but the experience gained still awaits evaluation and translation into educational practice on a wider scale. A quite different range of problems is caused by large-scale international migration movements, with implications for structures, curricula and teacher training.

Population education

52. While no definition of population education has been universally agreed upon, it may be described as an educational process designed to affect awareness, decisions and behaviour in population-related matters.

53. As a new field, population education has sometimes been confused with family planning education or family planning communications. In fact, it is neither, nor is it simply sex education, although some common elements may be shared by all of these, such as exploration of family size concepts and of ideas concerning responsible behaviour.

54. A survey of pilot projects in population education undertaken in a variety of countries suggests that population education has thus far been introduced primarily in the formal school context. This, however, in no way denies the importance of providing out-of-school youth and adults with the opportunity for the kind of population-related education they need if they are to have responsible roles in their families and communities.

55. Population data and information are frequently included in conventional education, both formal and non-formal. Social studies classes, for instance, may refer to the current size and make-up of an area's population and, perhaps, a history of migration of the area's inhabitants. Biology teachers may deal with animal and human reproduction. In less formal settings, social norms surrounding reproductive behaviour, marriageable age and other population phenomena abound and are communicated to members of groups through traditional channels. However, population education is more than simply an occasional reference to population phenomena in the class-room or learning through the process of socialization. It requires a critical analysis of population phenomena, with particular attention to their causes and consequences.

56. Population education is not propaganda or indoctrination. It is an educational approach intended

[20] *Ibid.*, p. 246.

to bring about an understanding of population phenomena. This implies that population change is not automatically seen as a problem from the outset of class-room activity. Students are followed to determine for themselves, after studying and discussing relevant data, whether the population situation in their community or nation or in the world at large may be described as posing a problem and therefore necessitating a solution. It follows that, if a problem is identified, its nature should be clarified and a variety of solutions explored.

Cultural determinants of programme emphasis

57. This view of population education makes it an appropriate area of study in both developed and developing countries, both in those countries whose Governments feel a need for larger populations as well as those in which it is desired to decrease the rate of growth or retard the pace of rural-urban migration and in rural areas faced with problems imposed by a declining population, high infant mortality and extreme poverty.

58. Cultural variations have determined differences in curriculum content in different geographical regions. In Asia, where a number of Governments have instituted national population policies, but where there is widespread resistance to formal sex education, population dynamics are usually treated in the class-room to the exclusion of many aspects of human sexuality which it is not considered necessary to deal with in order to achieve objectives and which officials fear might unnecessarily endanger the programme. However, essential micro-level population concepts, such as family size and related health and welfare, are not neglected.

59. Some Latin American countries place major programme emphasis on sex education because of the need felt for the individual to understand himself or herself as a sexual being as a prerequisite of the development of responsible behaviour towards others and because it is only relatively recently that rapid population growth has been seen as posing obstacles to the development of this region.

60. In neither case is the distinction complete. It is rather a question of emphasis, rooted in complex cultural and historical differences. However, the situation is not expected to remain static. For example, as Latin American universities and research institutes uncover more and more population data which are specifically relevant to Latin America, this new knowledge is expected to find its place in population education programmes.

loosely by private efforts at the national level through educational publications, news-letters and national conferences. African and European countries have reacted somewhat more slowly to the introduction of population education into educational programmes.

62. Regional differences in the balance between areas of emphasis in the curriculum should not be viewed as presenting a problem, but rather as advantageous in a field in which social relevance is a primary prerequisite of success. Regardless of which component of population education a country or region chooses to emphasize, common threads run through all programmes. First, students learn how population change affects them personally and, in turn, how they can affect population change. Secondly, and more important, the teaching methods required by population education enable students to learn how to take responsible decisions affecting themselves, their families and their communities.

63. If population education, indeed any formal education, is to respond successfully to its mandate and to prepare individuals for responsible adulthood, its contents must be relevant to the students' needs. In addition to acquainting students with the existing population situation, this implies change within the education system and preparation for the unknown, namely, a world situation which within a few years will be quite different from that of today. Teaching methods which promote inquiry, analysis and active student participation in the educational process will be essential components of this change and will help students prepare to meet the challenge of the future.

Where and when to begin

64. The difficulties posed by the introduction of new units or courses into an already overcrowded school curriculum are often insurmountable. Thus far, the most frequent response to this problem has been to introduce population content into several subject areas. Geography, biology and home economics, as well as history and social studies, are among the obvious subjects in which it can be incorporated. Mathematics lends itself, *inter alia*, to the study and interpretation of data. Health may include topics ranging from the influence of improved health on population growth to the advantages of child-spacing and problems of adolescent pregnancy. The food-population-environment situation may be explored in agricultural studies.

65. In teacher training institutions, the approach most feasible in view of resource shortages appears to be the incorporation of a basic unit or course on population, supplemented where possible when students move into a specialization. Familiarity with the student involvement approach mentioned above is, of course, a basic complement to population studies in teacher training institutions. In addition, such institutions can serve as experimental centres for the adaptation of modern educational techniques and methods to population education needs. The use of mass communications and other potentially productive methods in the class-room has been neglected in the past and needs to be explored as part of teacher training.

66. Many countries have embarked upon massive in-service teacher training programmes to meet immediate needs in population education. In the years to come, new findings will call for in-service refresher programmes to keep teachers up to date.

67. The question of the level at which population education should be introduced is an important one, particularly for developing countries with limited resources. In these countries, the large majority of the school population is in the primary grades, many in the very early grades. At this level, however, population education can hope to provide the students with only the most basic population concepts and tools for future decision making.

68. The primary-school child is usually far removed from the years in which he will be called upon to take decisions concerning his own fertility behaviour. If reproductive behaviour is to be influenced, children will need to be repeatedly exposed to population and family size concepts as they progress through the school years.

69. Although there are certainly valid arguments[21] for other choices, perhaps more can be said in favour of concentrating first efforts at the secondary school level. Being older and more experienced than preadolescents, secondary students can grasp population concepts in greater depth. This greatly facilitates the preparation of materials and helps avoid the risk of over-simplification found in primary programmes.

70. Although the numbers enrolled at this level are much smaller than those in earlier grades, these are the students who are already, or will soon be, taking decisions concerning marriage and reproductive behaviour, so that education in matters of fertility and individual responsibility is immediately relevant. Moreover, in some countries, secondary-school students will represent a small and influential proportion of their age group and will be the policy-makers of tomorrow. It is important, therefore, that they also understand the causes and consequences of population change and that they learn as much as possible about planning these changes in the interests of their communities and nations. This is even more true in higher education, not only in university departments, but in institutes of public administration and planning.

71. An additional important point favouring an early input at the secondary level is that this group of young people includes future teachers who will soon be working with youngsters at all age levels in both rural and urban areas. The leadership potential of this group is particularly high in rural areas (where many Governments require new teachers to begin their careers); and this may, among other things, facilitate the incorporation of population concepts into formal and non-formal educational programmes.

72. Within the school system, therefore, it is probably advisable first to invest in population education at the secondary level, accompanied by a parallel effort in teacher training institutions, expanding into the primary grades as resources permit. Population education, however, should not be made a monopoly of the formal school system. Those individuals who do not reach school and those who drop out after a few years will be the first of their age group to begin bearing children. These young people make up a significant proportion of the population of developing countries, and they are often the most difficult to reach through organized educational efforts.

73. As they move into the childbearing years, this group will also require exposure to population education. However, just as contents vary according to cultural and national contexts, the emphasis for out-of-school youth and adults will be samewhat different from that of school programmes. This group will most likely be interested in, and benefit from, early exposure to family planning education and to concepts of human sexuality and population change. (Family planning education, as employed here, includes an exploration of family size concepts, particularly within the individual and family contexts.)

74. In an attempt to meet the need for population and family planning, appropriate elements are being included in traditional health education, literacy, welfare and agriculture extension programmes in many countries. In addition, out-of-school youth clubs, camps and vocational training centres are beginning to call for assistance in developing family planning education programmes. A large percentage of young people, however, is not yet reached by such programmes. Current efforts need to be greatly expanded and new avenues explored if these persons are to receive the information and learning experiences they will need in order to take responsible decisions concerning reproduction and be prepared for future population-related experiences such as migration from familiar rural to often inhospitable urban surroundings.

The role of international co-operation

75. As indicated in the introduction to this paper, the focus of interest of international organizations in respect of population dynamics has on some occasions been on population as a cause of conflict, while, on others, on the pressure of population on food supplies. More recently, it has been on the relationship to the environment, on excessive population growth as an impediment to development and as a factor of unemployment, and on the individual's right to information on control of fertility.

76. UNESCO is concerned with education on all these aspects, but, in response to the interests of its

[21] See especially D. Chauls, "Population education should be introduced first at the primary rather than the secondary school level—a sociological approach", *The Journal of Family Welfare; Personal, Marital and Sociological* (Bombay), vol. XIX, No. 2 (December 1972), pp. 29-35. Chauls suggests the urgent need for introducing population education first at the primary level, particularly in rural areas where upper primary grades exist.

member Governments, is currently mainly concerned with providing them with information on population variables which affect development and supporting programmes designed to influence such variables.

77. In fulfilment of the first function, simulation models are being developed to demonstrate relationships between education and population change and research is being carried out through regional institutes and regional functional literacy centres. Studies of the quantitative impact of population pressure on education are also being carried out at the International Institute of Educational Planning in Paris The Office of Statistics of UNESCO is undertaking a four-year programme of country education projections which will give particular attention to the implications of population growth for enrolment and educational attainment

78. The action role is being rapidly expanded with resources from the United Nations Fund for Population Activities Because population policies of Governments, as well as attitudes towards population education and family planning, vary greatly between regions, a separate approach has emerged through UNESCO Regional Offices for Education in Asia, Africa and Latin America, where regional advisers are stationed, to explore the consequences for educational planning of population dynamics and to assist Governments, on request, in introducing population education into the curriculum within the school system, including teacher training colleges. In Asia, for instance, this is being done by a mobile team of population education specialists, set up to meet regional needs and to respond quickly to country requests for technical assistance. The team provides such services as planning and implementing workshops and training programmes, conducting and/or assisting in research-evaluation efforts and developing curricula and materials.

79 Outside the school system, it is planned to hold training courses on the introduction of population problems into professional schools, rural education development schemes and functional literacy courses.[22]

80. Some guidelines have been suggested as to future ways in which educational innovation may be used to affect population dynamics (see paras. 38-51) Current developments in population education also have been described (see paras. 52-74). It has been seen that in countries whose Governments have policies to restrict population growth, imaginative ways must be found to reach, on the one hand, those who influence public opinion and attitudes and, on the other, those segments of the population who have dropped out of, or never been involved in, the school system. In teaching about population it should never be forgotten that population dynamics are part of the wider development process. In many school systems, little or no attention is given to current economic and social problems in the country concerned It will often be important in organizing educational activities for mature people to gain their attention by some consideration of general or particular development problems before proceeding to more intensive study of population questions, which in any event should not be dealt with in isolation

81 The study of population and organization of population programmes involve several of the social sciences, demography, economics, sociology, political science and public administration being the most important They present a fascinating challenge in the construction of problem-oriented curricula in the classroom by bringing about interdisciplinary co-operation. This is part of the wider challenge of contemporary education which must be able to accomodate emerging world problems of crucial importance and to equip the child as well as the adult for understanding these problems and dealing with them as part of his or her various responsibilities and commitments.

82. On a broader scale, education in all its aspects is only one agent in programmes which deal with the effects of population dynamics Within UNESCO itself, those responsible for education collaborate with those responsible for mass communications and environment, whose concerns are the subject of separate papers presented to the World Population Conference Within the United Nations system, the relationship of education to the work of other United Nations agencies in health, family planning, home economics, demography and public administration and other fields is of great importance. The interdisciplinary study of population questions may become an important activity within the framework of the new United Nations University in view of the high priority which United Nations agencies are giving to population programmes in fields which are relatively new and in which there has been little time to assess results.

83. Much is still obscure in the relationship between population and education In a broad sense, knowledge is needed concerning all correlations and covariations between population dynamics and education. But, in this field as in all others, some selection has to be made between a very large number of interesting research topics, in order both to put limited resources to selective use and to ensure that the research topics chosen, singly and collectively, shall yield information useful to social planning.

84. Many studies have demonstrated a correlation between educational attainment, by levels, and fertility. In terms of planning, however, this information is of limited value. There is little or no evidence that the observed correlation would represent a causal nexus. Furthermore, the information cannot be used in the planning process. In some other respects, however, causal correlations exist between population dynamics and education. One example is the interrel

[22] *General Conference of UNESCO, Seventeenth Session*, "Draft medium term outline plan for 1973-1978" (UNESCO document 17C/4), subchapter 0 4, paras. 0203-0224.

between urbanization and education. It appears reasonable to give research priority to such interrelationships and concentrate on research topics relative to planning.

85. Because of the controversies which from time to time have arisen on population questions, there could be a tendency at the international level for action programmes and even research to concentrate on non-controversial areas. Certainly, action programmes can only be operated at the request of individual Governments and within the framework of their policies. Yet, the broad problems of population dynamics are inevitably global in their relationship both to security and to economic and social development. Educators cannot refuse to face questions merely because they are delicate. Many of the aspects of population that were mentioned by the first Director-General of UNESCO 25 years ago as needing to be dealt with by educators before they could be discussed between Governments have since not only been debated in intergovernmental assemblies but have become the subject of a reasonably broad measure of agreement. There remain others, however, where those who are involved in population education will have an essential role to play in preparing the way for them to be dealt with at intergovernmental level. Equally important may be the role of education in opening up discussion within and outside the educational system on aspects of the population question concerning which international agencies have passed resolutions whose implications still remain to be fully investigated.

HEALTH TRENDS AND PROSPECTS IN RELATION TO POPULATION AND DEVELOPMENT *

World Health Organization

HEALTH TRENDS AND PROSPECTS, 1950-2000

1 This report should be concerned with health as defined in the Constitution of the World Health Organization, namely "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

2. Unfortunately, nowhere in the world can health be measured yet in these terms Moreover, even in many developed countries it is difficult to find information on the general prevalence of ill-health, i e, morbidity. It has therefore been necessary to adopt a restricted view of health measurement; and, for the most part, to confine discussion to the trends and levels of mortality from a public health point of view.

3 Even for mortality, measurements are still inadequate in many parts of the world and barely adequate in many others, due in part to the lack of an effective and complete system of registration of deaths and in part to the lack of reliable estimates of the sex and age distribution of the population *It is unfortunately still true that* for only about one third of the world population (mainly in the developed countries) is there satisfactory registration of vital events Survey methods have been successfully used in a number of less developed countries, but not on a sufficiently extensive scale. The problem of deficient recording is particularly acute for infant deaths, it has been estimated that only 2 per cent of such deaths are registered with reliability [1] Relatively few detailed results of the 1970 round of population censuses are as yet available. It could possibly be that when more reliable data become available for the less developed countries, some (even radical) reassessment of trends will be required. It has already been suggested that some of the discrepancies between projected and enumerated populations of the 1970 round of censuses may have arisen from over-estimation of the pace of mortality decline. [2]

4 The crude annual death rate (number of deaths per 1,000 population) in the period 1965-1969 averaged over the whole world was 14 per 1,000 Such a rate, concealing wide variations between regions and even between countries within individual regions, has no real public health meaning; but it is still important in that, in conjunction with a similarly averaged birth rate, it indicates the annual rate of increase in the population of the world.

5 Expectation of life at birth gives a better comparative picture, it is generally considered the best single indicator of the health status of a population The expectation of life is independent of the actual age structure of the population, though it is not age-standardized as between regions and areas because it is dependent upon the hypothetical age structure resulting from constant births and the persistence of current age-specific rates of mortality. Crude death rates, however, reflect differences in the age structure of the population and/or age-specific rates.

6. In less developed regions, where 75 per cent of the world population live (1970), the average death rate in the period 1965-1969 was estimated to be 16.1 per 1,000 and expectation of life at birth was estimated at 50 years. In the developed regions, the average death rate for the same period was 9.1 per 1,000; life expectancy at birth was 70 years. As recently as 1935-1939, the expectation of life at birth in the less developed regions was estimated to be 32 years—even then as good a prospect as at the height of the Roman Empire; [3] in comparison, the current expectation of 50 years represents a striking improvement.

7. A strong association exists between life expectancy at birth and gross national product *per capita* [4] As demonstrated in table 1, expectation of life at birth can be used as a measurement of development.

[illegible] publication, Sales No 71 XIII 4)

[2] A comparison of total population figures from censuses taken around 1970 with population estimates for selected countries, United States of America, Bureau of the Census, International Statistical Program Center, Research Document No 4 (Washington, D C., Department of Commerce, 1973)

[3] G. Acsádi and J. Nemeskéri, *History of Human Life Span and Mortality* (Budapest, Akadémiai Kiadoó, 1970).

[4] B Pirc, "Demographic and health aspects of mortality problems and prospects related to mortality analysis for the data in less developed countries" (unpublished manuscri t).

TABLE 1. *Per capita* GROSS NATIONAL PRODUCT AND EXPECTATION OF LIFE AT BIRTH, SELECTED COUNTRIES

Per capita gross national product (dollars)	*Expectation of life at birth*								
	Less than 40 years	*40-44*	*45-49*	*50-54*	*55-59*	*60-64*	*65-69*	*Over 70*	*Total*
Less than 200	2	3	2	4	—	1	—	—	12
200-399	3	1	3	3	3	—	1	—	14
400-599	—	—	—	1	—	3	1	—	5
600-999	—	—	—	1	2	2	4	—	9
1,000-1,999	—	—	—	—	—	—	6	1	7
2,000 and more	—	—	—	—	—	—	8	4	12
Total	5	4	5	9	5	6	20	5	59

SOURCES: For *per capita* gross national product, *Statistical Yearbook, 1969* (United Nations publication, Sales No. 70.XVII.1); for expectation of life at birth, *Demographic Yearbook, 1969* (United Nations publication, Sales No. 70.XIII.1).

Trends and prospects in less developed regions

Overview

8. Mortality levels vary quite markedly within the less developed regions. In South Asia, life expectancy varied between 48.3 years in 1965-1969 in the middle south, to 51.4 in the south-west. In mainland East Asia, it was about 50.5, and in other parts of East Asia (excluding Japan), it was 60.3. In Africa, the expectation of life at birth ranged from 39.2 in the western and middle parts, to 48.0 in southern Africa and 49.8 in northern Africa. In Latin America, the difference was narrow, between 58.5 in the Caribbean, 59.7 in the tropical south and 60.3 in middle America, according to United Nations estimates.

9. In the less developed countries, national indexes (such as the expectation of life) may conceal wide variations of mortality levels within the countries themselves, wider than in developed countries. In India, for example, there will be divergence between areas less affected and those more affected by famine conditions. In 1967-1968, data from the National Sample Survey and Sample Registration Schemes indicate that infant mortality rates may vary between states, from as low as 60 to as high as 180 per 1,000 live births.[5]

10. Many low-income, less developed countries in Latin America, Asia and Africa have, over the past two decades, shown a pace of improvement unparalleled in human history. In a number of countries in these regions, expectation of life at birth has increased within this 20-year period to a degree which it took today's low-mortality countries half a century or more to achieve. However, it is not yet possible (owing to the lack of the 1970 census results) to evaluate the mortality experience of the 1960s precisely; or, to put it differently, to answer the question, how far assumptions on mortality reductions in the 1960s were validated by actual trends. In India, for example, in the mid-1960s, an average annual increase of 0.9 years to the expectation of life at birth had been assumed, which is now considered to have been an over-optimistic assumption.

11. For the less developed regions as a whole, a gain of eight years within the past two decades was obtained, according to United Nations estimates. As a result of the dramatic reductions referred to above, which, in their turn, reflect not only improvements in levels of living in general and nutrition in particular, but recent advances in medical technology, public health and sanitation, there now emerges a world-wide trend towards a narrowing of mortality differentials between high and low mortality regions. This convergence is also a result of the fact that expectation of life at birth in developed countries has reached a level beyond which further progress is only comparatively slowly attainable. The difference in expectation of life at birth has been reduced from 23.4 years to 20.8 years in the period under observation. This global trend, however, does not imply that all high-mortality areas are as yet fully participating in this development.

12. Parallel to the tendency towards a reduction of mortality differentials between developed and less developed regions, there exists a trend towards a widening of differences within the less developed regions. Whereas some countries, particularly in Latin America, are approaching levels of life expectancy at birth comparable to the stragglers in the developed regions, others are either stagnant or their decrease has slowed down. For most of Africa, lack of information prevents a detailed assessment of mortality trends in the period 1950-1970. Estimates of "current" levels vary according to the reference period, but the available evidence suggests that, except for islands such as Mauritius, no country in West, Central or East Africa (excluding South Africa) has a life expectancy at birth beyond 45 years.[6] Not much better documented are

[5] Report on population projections worked out under the guidance of an Expert Committee set up by the Planning Commission under the chairmanship of the Registrar General, India (New Delhi, Office of the Registrar General of India, Ministry of Home Affairs of India, 1969).

[6] R. Som, "Mortality levels in Africa", *International Population Conference, London, 1969*, vol. II, pp. 884-889.

trends in the Arab countries. Life expectancy at birth has been estimated at 42 years for 1965-1969 in southern Arab countries and at around 53 years for northern Arab countries.[7] In a study of trends in Latin America between 1930-1960, it was concluded that "... the later the date of decline, the faster its rate. Nationwide programmes sponsored by each country and/or by international aid programmes are the principal cause of this rule Public health programmes are no longer dependent on the country's economy but rather, to a large degree, on the technology and concern of the most advanced countries in the world"[8] This statement has to be seen in the light of the fact that this investigation did not cover the crucial developments in the 1960s which have been leading to a certain reassessment of the long-term impact of public health programmes in the absence of advances in levels of living.

13. One of the major tasks ahead is the investigation of the factors underlying the differences between less developed countries as concerns the date of onset and pace of mortality reductions. Wherever applicable, the factors responsible for a deceleration should be uncovered, a task of fundamental importance for evaluating future prospects, but one seriously hampered by lack of adequate data.

14. Much discussion[9] has focused on the relative contributions of public health programmes, particularly disease eradication programmes, and improvements in levels of living, to the striking leap forward in survival chances. Malaria eradication in particular—previously probably the most important single cause of sickness and death—has had a significant impact on mortality in some countries However, the view that declining mortality in less developed countries can be attributed entirely to public health has proved to be an over-simplification of a rather complicated set of interrelated facts, and by no means a straightforward cause-effect relationship. It appears plausible to assume that a certain take-off into development is prerequisite to entering into the phase of rapidly falling mortality. Efficient government, progress in education, road communications and an even rudimentary administrative infrastructure appear to play an important role in the initial stage Once the decline is under way, public health measures, supported and co-ordinated in many cases at an international level, become increasingly important and effect a decline of such rapidity that improvements in levels of living are out-distanced. However, it appears that a life expectancy at birth of 55-60 years constitutes a point beyond which the social, political and economic factors again become increasingly operative Availability and accessibility of an efficient health service infrastructure and a vigorous health policy, together with over-all progress in the socio-economic field, then determine the extent and pace of further gains

Sex and age patterns

15 The curve of variation of mortality with age is U-shaped, with high infant mortality and relatively high mortality in childhood causing a slower fall in the left-hand side of the curve than in developed countries, and generally heavier adult mortality causing an earlier and slower rise in the right-hand side of the curve Lack of good registration data in the less developed countries makes it impossible to make wide-ranging comparisons of the age patterns of mortality It is clear, however, that in the less developed countries the mortality differentials between the two sexes are less regular Though the mortality of males is, over all, usually higher, there are numerous examples of particular age groups where the mortality of males is lower than that of females Life expectancy at birth is higher for males than for females in India and Pakistan, for instance, and was so until 1967 in Sri Lanka.

16. Mortality in the first year of life is sensitive both to the level of exposure to infection from the environment and to the level of resistance to that infection (itself a function of nutrition and other environmental factors) Since these determinants are themselves directly related to the level of living, infant mortality is inversely related to, and thus serves as an index of, social and economic development; at least until the stage is reached at which the exogenous risks (infections, nutritional disorders, birth injuries etc) are minimal, i e., when an advanced stage of economic development has been attained. The sensitivity of infant mortality to changes in economic conditions means that in the less developed countries where change is taking place, the rate may be expected to vary widely Conversely, as between the developed countries, less variation in the infant mortality rate may be expected.

17 The measurement of mortality in the first year of life (normally expressed as deaths under one year of age per 1,000 live births) depends upon the existence of an adequate system of birth and death registration (including precise terminology and definitions). Since the institution of complete vital registration presupposes the implementation of administrative machinery that itself implies fairly advanced economic development, the less developed countries are, almost by definition, areas for which measures of infant mortality are lacking. It is known that in many of these areas, the rate is above 100 and may be as high as 200.

18 In the attainment of an expectation of life of 70 years or more in the developed count[illegible] the

reduction in infant mortality has played a major role. The same process is presumably occurring in the less developed areas of the world. A study of mortality trends in South Asia over the last two decades revealed that the "transition from very low to higher life expectancy was distinctly marked by significant improvements of mortality during infancy and early childhood". [10] (In females, the second largest component of mortality change was the decrease of death rates during the childbearing period.)

19. The Inter-American Investigation of Mortality in Childhood, [11] sponsored by WHO, carried out between 1968-1972, was a hemispheric research project, implemented in 15 different places (of which 13 were in Latin America and one each in Canada and in the United States of America) according to a uniform programme design. The main findings of this international collaborative study can be summarized as follows:

(*a*) Nutritional deficiency was the most serious health problem, as measured by its involvement in mortality, and it is coupled with low weight at birth;

(*b*) The peak of mortality from nutritional deficiency was in infancy as early as the third and fourth month of life, but marked differences in the pattern were found;

(*c*) Analysis of multiple causes was the basis for the measurement of health problems in infancy and childhood: 57 per cent of the children who died under age 5 had either immaturity or nutritional deficiency as underlying or associated cause of death;

(*d*) Diarrhoeal disease was the principal cause of death, with measles ranking second among the infectious diseases;

(*e*) Child mortality was much higher in rural areas than in the neighbouring cities, the variation being greatest for children in the second year of life;

(*f*) An inverse correlation was found between infant mortality and pre-natal care, as well as between social-class indicators, such as education of mother and infant mortality.

20. It has been argued that in less developed countries, the rate of mortality at ages 1-3 or 1-4, is comparatively free of the impact of peri-natal risks, while, on the other hand, reflecting any nutritional deficiency during and after the weaning period, and is therefore a more sensitive index of social and economic development and of the delivery of health services than infant mortality. [12] Unfortunately, these data are generally still lacking. It is urged that a concentrated effort should be made to remedy this deficiency by whatever means possible—improvement in registration services or local surveys. Such figures as are available indicate that, as compared with a rate of 1 per 1,000, or a little less for developed countries, rates of the order of 50 per 1,000 are not uncommon in the less developed countries. There are also differences from trends in the currently developed countries in that in many of these countries the mortality decline for female children has been frequently slower than that for males. As a result, female children at ages 1-4 frequently exhibit higher mortality than male children. This has been remarked upon for Bangladesh, India, the Khmer Republic, Pakistan and Sri Lanka. [13] There is clearly scope for considerable reduction in child mortality rates in the less developed countries—a reduction which must be achieved if survival prospects are to be convincingly improved.

Causes of death

21. Once again the lack of adequate registration systems in less developed countries precludes detailed information of cause of death patterns. The information made available to WHO on cause-of-death patterns covers less than one third of the world population. [14] This is a grave deficiency and great efforts should be made to remedy it.

22. In England and Wales, throughout the nineteenth century, one third of all deaths were from infectious diseases; and as late as 1921, more than one quarter of all deaths were from these causes. [15] In the less developed countries with younger age distributions (themselves the product of high mortality from infections), the proportion of deaths that are from infectious diseases is likely to be even higher than one third. It has been estimated that in 1960 in Latin American countries, about 40 per cent of deaths were due to infectious diseases. [16] For the remainder, deaths from circulatory diseases would probably account for one fifth. There would be few deaths from cancer—perhaps 5 per cent; the same proportion would take account of deaths from violent causes. This leaves rather more than one third of all deaths to be attributed to a miscellaneous spread of causes.

23. The first line of attack in reducing mortality in the less developed countries must therefore be against

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[10] L. T. Ruzicka, "Infant and childhood mortality in the countries of South Asia: a review", Second Asian Population Conference, Tokyo, 1972; M. El Badry, "Higher female than male mortality in some countries of South Asia", in *International Population Conference, London, 1969*, vol. II, pp. 863-877.

[11] R. R. Puffer and C. V. Serrano, *Patterns of mortality in childhood*, Scientific publication No. 262 (Washington, D.C., Pan American Health Organization, Pan American Sanitary Bureau, Regional Office of the World Health Organization, 1973).

[12] V. G. Wills and J. C. Waterlow, "The death rate in the age-group 1-4 as an index of malnutrition", *Journal of Tropical Pediatrics*, vol. 3 (1958), pp. 167-170; J. E. Gordon, J. B. Wyon and W. Ascoli, "The second year death rate in less developed countries", *American Journal of Medical Science*, vol. 254 (September 1967), pp. 357-380.

[13] L. T. Ruzicka, *loc. cit.*

[14] *World Health Statistics Annual* (Geneva, World Health Organization, 1973).

[15] W. P. D. Logan, "Mortality in England and Wales from 1848 to 1947", *Population Studies*, vol. IV, No. 2 (September 1950), pp. 132-178.

[16] E. E. Arriaga and K. Davis, "The pattern of mortality change in Latin America", *Demography*, vol. 6 (1969), pp. 223-242.

infectious diseases. With such a large proportion of deaths due to infectious diseases (at life expectancies at birth of less than 45 years, 20 per cent of all deaths are attributed to infectious diseases), a significant reduction in mortality may still be achieved by continuing programmes of preventive medicine and public health regardless of any slowness in economic development. A major example of the success—albeit incomplete—of public health measures is that of the world-wide campaign to eradicate malaria, as already mentioned (para 14) Guatemala, Guyana, Mauritius, Pakistan, Sri Lanka and Venezuela provide evidence of dramatic reduction in malaria mortality However, data for Guatemala reveal that despite an initial sharp drop in the number of deaths due to malaria, the general death rate was reduced by a relatively modest extent and remained more or less constant in the 1960s.[17] A similar stagnation is now noticeable, for instance, in Sri Lanka and Venezuela. Campaigns against tuberculosis have been no less dramatic, but they are most effective where the level of living is high, so that while deaths have been reduced to small numbers in the developed countries, tuberculosis still ranks high among priority problems in most parts of the world. Large numbers of smallpox deaths have, until recently, been recorded in India, Indonesia and Pakistan—in 1969, there were about 3,000 An international eradication campaign is now in full operation. Yellow fever is now under effective control with only a few centres of infection remaining.

24 Cholera was limited in the early 1960s to South-East Asia; however, its rapid spread to other countries in Asia, Africa and Europe in the late 1960s and the beginning of the 1970s is a severe warning that if an endemic focus of disease remains, continuing epidemiological surveillance remains vital. Steady though slow progress has also been achieved in the control of leprosy Other important diseases, such as schistosomiasis, trypanosomiasis and filariasis, have been the object of specific campaigns with varying degrees of success. The control of these diseases would have marked economic and health effects on the population of countries now affected by them.

25. In a comprehensive study of deficiency diseases,[18] it was found that such diseases as beriberi, pellagra, rickets and scurvy have either disappeared or at least do not today represent a major health problem Protein-calorie malnutrition, however, is a world-wide threat to child health; but even here, a position of guarded optimism was taken with respect to its control and eventual elimination Recent developments in parts of Africa underline that self-complacency is premature. Further progress will be intimately linked to a satisfactory solution of agricultural production in less developed countries.

26 A synoptic overview of the three most important killers in the less developed countries, by age, in the mid-1960s is given below (because of its peculiar structure, infancy is not included here)

[17] S A Meegama, *loc. cit*

[18] W R Aykroyd, *Conquest of deficiency diseases achievements and prospects*, Freedom from Hunger Campaign Basic Study No 24 (Rome, Food and Agriculture Organization of the United Nations, 1970)

Age	*First cause*	*Second cause*	*Third cause*
1-	Influenza and pneumonia	Gastritis and enteritis	Accidents
5-	Accidents	Influenza and pneumonia	Malignant neoplasms
15-	Accidents	Tuberculosis	Malignant neoplasms
45-	Heart diseases	Malignant neoplasms	Vascular lesions
65 and over	Heart diseases	Vascular lesions	Malignant neoplasms

27 In assessing this presentation, it is important to bear in mind that the cause of death pattern listed for less developed countries is by no means representative of this group, but biased towards countries with cause of death statistics, already by itself a major source of selection towards the relatively more developed among less developed countries.

28. In infancy, deaths from infectious diseases and from nutritional inadequacy and disorder predominate. In some less developed countries with cause-of-death information, between 25 and 50 per cent of recorded infant deaths are ascribed to gastritis and enteritis.

29 In quadrennial reports[19] published by WHO since 1954 on the world health situation, Governments provided information on the major health problems in their countries. In the second half of the 1960s, the following picture of selected major health problems was obtained, by order of frequency mentioned.

(*a*) *Africa*. tuberculosis, malaria, leprosy, schistosomiasis, onchocerciasis, trachoma,

(*b*) *Americas* (excluding Canada and the United States of America): tuberculosis, intestinal parasitosis, malnutrition, malaria, poliomyelitis, accidents;

(*c*) *Asia* (excluding Japan): tuberculosis, diarrhoeal diseases, malaria, intestinal parasitosis, respiratory infections, leprosy.

Differences between population groups

30 Apart from age and sex differentials in mortality, there are other population characteristics which affect health and mortality and which give rise to differentials within countries. These characteristics include a number of socio-economic variables, such as

[19] *Fourth Report on the World Health Situation (1965-1968)*, Official Records of the World Health Organization, No. 192 (Geneva, 1971), W C Cockburn and F. Assaad, "Some observations on the communicable diseases as public health problems" (unpublished manuscript)

occupation, income, housing, education, nutritional level and habits; and also embrace ethnic origin, religion, physical environment deriving from geographical location, for example, urbanization, and from marital status. [20] These factors are highly interrelated. People with high incomes can also afford good housing in a less intensively urbanized environment and may even tend to be found in a particular ethnic group. The assessment of the separate contributions of these factors is, therefore, a matter of some difficulty. It has been argued that the best summary variable, representing all these factors in due weight is the social category (variously described as "socio-economic group" or "social class") determined jointly by occupational skill and status and the branch of industry. In general, the better the social and economic circumstances, the lower the mortality. Evidence on social-class differentials is fragmentary. However, it is realized that health is a determinant, as well as a consequence, of socio-economic conditions. Reference has already been made to the association between expectation of life at birth and *per capita* gross national product (see para. 7 and table 1). In a study, expectation of life at birth was found to be the best of the health indicators studied. [21]

31. Too little is known about urban/rural differentials in less developed countries. There is some evidence that in less developed countries, mortality in cities is less than in the countryside and appears to have had an advantage as far back at least as around 1920. [22] Urban/rural differences in infant mortality have been documented. They are probably due more to a lack of medical care and non-availability of medical facilities in the rural areas than to economic conditions. Data from India and Indonesia, for instance, show that about 90 per cent of women in rural areas do not receive assistance by trained attendants at birth. The situation is better in urban areas, but far from satisfactory.

32. A co-ordinated inter-American investigation, Patterns of Urban Mortality, [23] was carried out during 1962-1964 in 12 cities (of which 10 were in Latin America, one in the United States and one in England and Wales). The two leading causes of death among adults of age 15 to under 75 were diseases of the heart and malignant neoplasms in males, and in a reversed order for females. Remarkable differences became apparent for broad groups of cancer sites. Among males, in two of the 12 cities, lung cancer occupied first place, while in the other 10, cancer of the digestive organs. In females, cancer of the digestive organs was preponderant in two cities, while in the other 10, cancer of the breast and genito-urinary system.

Prospects

33. Projections of mortality trends as a component of demographic projections have become a routine feature in developed, as well as in a steadily increasing number of less developed, countries. The following discussion is not intended to compete with national projections based on an intimate knowledge of the specific national conditions, but rather focuses on the global prospects for further reductions in mortality.

34. Experience in the currently developed countries suggests that the later a country enters into the phase of decreasing mortality, the more rapid the transition to the low mortality pattern. This hypothesis was largely substantiated by developments in the 1950s, but the course of mortality in the 1960s has—as already mentioned—given rise to a more nuanced evaluation. The pace of decline varied considerably among less developed countries; and the slowing down of this pace, assumed to have occurred in some less developed countries, may indicate that a threshold value has been reached beyond which further gains in life expectancy will depend upon over-all development. In brief, the fundamental question is whether improvements in levels of living are prerequisite to sustaining the momentum of declining mortality until less developed countries have caught up with the developed ones. (Another explanation of the failure of death rates to decline in the 1960s at the anticipated rate may be that after the dramatic reductions in the 1950s, a period of "consolidation" was necessary before the downward trend can be resumed with full speed.)

35. One may therefore conclude that the potential for further impressive gains exists; however, actual progress will be determined by a multiplicity of problems whose solution is, generally speaking, not yet readily in sight. Mortality prospects cannot be assessed in a mechanical way isolated from prospective changes in the societal *milieu*, nor can the experience of other countries be "'borrowed" where their initial conditions may have been radically different. Current knowledge, if properly applied, should make an expectation of life at birth of 60-65 years in the currently less developed countries by the year 2000 attainable. For national projections of death rates, a thorough review of the economic and social situation, both current and projected, should be considered an indispensable prerequisite of a realistic assessment of future trends.

Trends and prospects in developed regions

Overview

36. Because of the current low level of mortality and the greater effort to achieve further gains, there is

[20] B. Benjamin, "Social and economic factors affecting mortality", in *Confluence: Surveys of Research in the Social Sciences*, vol. V (The Hague, Mouton and Co., 1965).

[21] United Nations Research Institute for Social Development, "Contents and Measurement of Socio-economic Development".

[22] K. Davis, "Cities and mortality", in *International Population Conference, Liège, 1973*, vol. 3, pp. 259-282; G. Z. Johnson, "Health conditions in rural and urban areas of developing countries", *Population Studies*, vol. XVII (1964), pp. 298-299.

[23] R. R. Puffer and G. W. Griffith, "Patterns of urban mortality", Scientific publication No. 151 (Washington, D.C., Pan American Health Organization, Pan American Sanitary Bureau, Regional Office of the World Health Organization, 1967).

much less variation in mortality levels among developed regions than among the developing regions. In 1965-1969, the crude death rate averaged 9 per 1,000 over the whole of these regions, the three countries significantly varying from this average being Iceland (7 0), Japan (7 0) and the Union of Soviet Socialist Republics (7.7). These differences disappear when reference is made to expectation of life at birth. In temperate South America, expectation of life at birth was only 64 6, as compared with a figure of 70 in most developed regions.

37. For the developed regions as a whole, expectation of life at birth increased from an estimated 64 6 to 70.4 years between 1950-1954 and 1965-1969. The rate of improvement was, on the whole, slower in western and northern Europe and northern America, where the current very low mortality levels represent a comparatively long-standing achievement. Countries in these regions may be generally looked upon as having attained some degree of maturity in social and economic, environmental, education and health services development This is not to say that there is no room for further improvement. On the contrary, there is evidence to suggest that further increase in expectation of life at birth is attainable. Reference is made below to persisting environmental risks which can be avoided if there is the individual will to do so Nevertheless, there is clearly more resistance to extending the expectation of life from 65 to 70 years than from 45 to 50 years.

38 A recent analysis of mortality trends in developed countries (except temperate South America) between 1955-1959 and 1965-1969 showed the following result.

Number of countries with a change or with no change in expectation of life

Age	Males			Females		
	Increase	No change	Decrease	Increase	No change	Decrease
0	15	—	2	17	—	—
1	12	1	4	17	—	—
15	10	1	6	17	—	—
65	5	3	9	17	—	—

Population Conference, Strasbourg, 31 August-7 September 1971.

39. The crucial fact emerging from a study of mortality trends in the past two decades in the developed regions is that gains in expectation of life were largely concentrated in the 1950s, whereas developments in the 1960s were, on the whole, disappointing This statement holds even if one admits that some slowing down was to be expected in view of the good results already achieved Whatever improvements that were recorded were generally restricted to infancy and childhood and the female sex For males as well as females, there is a noticeable, almost universal, picture of a substantially reduced pace of declining mortality, with a virtual standstill, or even a set-back, for males. Evidence is also accumulating that, in some countries and for some age groups, female mortality may follow the same course The major causes for this cessation of further improvements in male mortality and actual deterioration in several countries are cardio-vascular diseases, malignant neoplasms and accidents, three cause groups to which about two thirds of the male new-born will ultimately succumb if the current cause of death structure persists

Sex and age patterns

40 In developed countries, mortality is highest at the extremes of age. Once the new-born infant has survived the hazards of the first few days of life, mortality falls rapidly. During childhood, the risk is very small and at its lowest (annual death rate about 3 per 10,000); it is very largely confined to that of the occasional fatal infection, which treatment with antibiotics and modern drugs has made extremely rare, to leukaemia, congenital malformations and, above all, severe accidental injuries to which childish recklessness or lack of adult care sometimes leads In adolescence, the impact and strain of industrial life brings a rise in mortality; and these and other factors inherent in the social and economic environment and individual ways of life, reacting upon constitutional weakness where that exists, lead to a continuing increase in the risk of death as age advances. At old age, the sheer wearing-out of the human frame rather than inimical qualities of the environment becomes the dominant cause of mortality. Ideally, if this natural wearing-out (true senility) were the only cause of death, the curves of variation of mortality rates with age would take the form of a J, with rates maintained at insignificant levels until advanced ages when there would be a sudden upward rise.

41. For some developed countries, tables of age-specific death rates for more recent generations do show considerable progress towards tate b

situation is still some distance from the ideal. During the years of adolescence, mortality rises to 1 per 1,000. After the age of 30, the stresses of working life and its associated environment lead to the intervention in increasing numbers of what have been referred to as "anticipated", as distinct from "senescent" deaths. These "anticipated" deaths embrace accidents, some forms of heart and chest disease and early neoplasms. Death rates begin to rise with increasing steepness reaching, for males, 20 per 1,000 by the age of 60, and more than 100 per 1,000 by the age of 80. For females, the rise is, for most of the age range, less steep; the rise is to about 10 per 1,000 by the age of 60; thereafter, the rise is steeper—to 100 per 1,000 soon after the age of 80.

42. The death rates for females are lower than those for males at all ages. This is true of all the developed countries. Moreover, age for age, the relative sex differentials are of much the same order in all these countries. In earlier times, there used to be an excess in the death rate of females at adolescence and early adult age, mainly associated with the heavier mortality from tuberculosis in girls and with the then high rates of maternal mortality. Since that time, the general level of tuberculosis mortality has fallen so much that this differential has no effect upon the comparison of rates from all causes, and maternal mortality in many developed countries is insignificant. Briefly, the source of the higher mortality of males may be summarized as follows:

(*a*) In infancy and early childhood, boys are generally more vulnerable to some birth hazards (prematurity, malformation, birth injury); to infection, possibly as a result of some biological factor; and to injuries, possibly as a result of more vigorous venturesome activity; these being the principal causes of death at these ages;

(*b*) In early and middle adult life, the principal causes of death are accidents and violence, tuberculosis, heart disease and cancer; and except for the latter cause, the death rates are higher in men. The excessive mortality from tuberculosis in men (except in very early adult life) is a reflection of the generally greater vulnerability of men to respiratory disease of all kinds, not only tuberculosis, but bronchitis, influenza, pneumonia, cancer of the lung (and this greater vulnerability extends to advanced ages) and ischaemic heart disease. The higher risk of accidents must be regarded as occupational in the broader sense of including, as compared with females, more outdoor movement of traffic etc., as well as greater industrial hazards;

(*c*) At more advanced ages, the process of physical deterioration and lessening resistance to disease associated with general wear and tear appear to proceed faster in men. Age for age, cerebral haemorrhages, arterial disease, cancer (especially of the lung) and bronchitis, in general, take a heavier toll of males than females.

43. Because many of the causes of death involved in the higher mortality of males are those known to derive from the mode of living (occupational stress, high caloric consumption, smoking, lack of exercise etc.), at least part of the differential must be preventable. The problem is largely one of educating men not to accept so willingly these ways of killing themselves.

44. As compared with the situation 10 years ago, the difference in expectation of life at birth between males and females has uniformly increased. Among the developed countries with readily available data for both periods 1955-1959 and 1965-1969, the female advantage varied between 4 and almost 8 years in 1965-1969 (as compared to from 3 to less than 7 years a decade ago). The same picture emerges for life expectancy at age 65.

45. The important lesson to be learnt from the differing trend of male and female mortality is that the poor performance of males over the past two decades happened despite the fact that they were already at a disadvantage at the onset of the period studied. Biological factors can, therefore, safely be ruled out as an explanation. There is some evidence suggesting that attitudes towards health and disease, and the propensity to utilize health facilities may differ between males and females. Some risk factors, such as smoking and alcohol consumption, are more prevalent among males, and at a certain level of exposure more fatal to them, a reflection of differences in susceptibility to environmental risks. Only a positive response to vigorous health education programmes and adaptations in the mode of life can bring about a change for the better.

46. In the developed regions (excluding temperate South America), infant mortality rates ranged in 1969 between 12 and 56. In all these countries, infant mortality is still declining, even in those where the rates are already below 15. However, in many developed countries, post-neo-natal mortality (i.e., mortality from 28 days to under 1 year), which is particularly sensitive to environmental influence, has already reached such a low level that further reductions in infant mortality will depend upon the success of efforts to reduce mortality from endogenous causes.

47. On the whole, absolute as well as relative reductions of infant mortality in developed countries were greater in the 1950s than in the 1960s. However, some countries continued to experience substantial decreases. Mortality in the first week of life decreased to a lesser extent than mortality in the following three weeks of life; and mortality at this age, in its turn, showed less reduction than post-neo-natal mortality. As a result, the proportion of infant deaths occurring in the first four weeks of life has risen from about one half to more than two thirds during these two decades.

48. The magnitude of the decrease in infant mortality over the past two decades—and this statement holds for developed as well as for less developed areas—has been strongly influenced by the inroads made in the infectious and digestive diseases among infants.

49. Increasing importance is now being attached to "peri-natal mortality" (deaths occurring either in the first seven days of post-natal life or during the period between the twenty-eighth week of intra-uterine life and birth, i.e., late foetal deaths, usually expressed per 1,000 live-born and late-foetal deaths). Apart from contributing to better intercountry comparability by overcoming some of the difficulties arising from differences in legal definitions and administrative procedures for the recording of pre- and post-natal deaths, its importance lies in the consideration given to life before and during the birth and in its adoption as a measure of the effectiveness of obstetrical care. Recognition of the need to concentrate on this period has greatly increased, with increasing control of the once common causes of infant mortality. In a number of countries, peri-natal deaths now exceed the number of deaths in the next 35-40 years of life.[24] Today, peri-natal deaths account for about three out of four losses occurring in either the late foetal period or first year of life. Unfortunately, cause of death data are grossly defective for the peri-natal period, if at all available.

[24] *Programmes of Analysis of Mortality Trends and Levels*, report of a joint United Nations/World Health Organization meeting, 1910, World Health Organization Technical report series, No 440 (Geneva, 1970).

50. The reported causes include congenital malformations, birth injuries, asphyxia and neo-natal infections; the major part of all late foetal deaths is ascribed to diseases of pregnancy and childbirth, difficulties in labour, placental and cord conditions, congenital malformations of the foetus and diseases of the foetus including ill-defined conditions For most of these "causes", the mode of operation of the cause of death remains largely unknown The major part of deaths in the first week of life are attributed to congenital malformation, birth injuries and the ill-defined group (including immaturity).

Causes of death

51. The current cause of death structure in developed countries is best summarized in the following synopsis (infants are discussed separately):

Age	First cause	Second cause	Third cause
1-	Accidents	Influenza and pneumonia	Congenital malformations
5-	Accidents	Malignant neoplasms	Congenital malformations
15-	Accidents	Malignant neoplasms	Heart diseases
45-	Malignant neoplasms	Heart diseases	Vascular lesions
65 and over	Heart diseases	Vascular lesions	Malignant neoplasms

52 Infant mortality is concentrated more and more on the early weeks of life and is due to endogeneous causes, such as prematurity and to congenital malformations Improvement in social and economic conditions, though favourable to a reduction in these deaths, is not in itself sufficient. The role of obstetric and paediatric care becomes much more important, as does the provision of institutional as distinct from domiciliary facilities. Unfortunately, the study of the cause of death pattern in infancy is severely handicapped by the poor quality of data. Ill-defined and unknown causes account in some countries for up to 30 per cent of all infant deaths, and for deaths in the first week of life this percentage is even higher.

53. A convenient method of analysing cause of death patterns is the computation of the chances of ultimately dying from a given cause. This method sums up the deaths from the cause studied in a life-table cohort and then forms the ratio of the total number of deaths from the specified cause at and above a given age to the number of survivors at the given age in the life table. It is assumed that the mortality pattern of the life table, as well as the age-specific ratio of deaths from the specified cause to all causes, remains unchanged. A summary of such an analysis for Europe and North America in 1968 is given in table 2. It shows the sex, as well as age-specific, pattern of ultimately dying from the three major killers (cardio-vascular diseases, malignant neoplasms and accidents) in developed countries From age 60 on, the chances of dying from any one of these three causes decline because of the increasing importance of other "competing" causes, such as respiratory diseases (particularly pneumonia), the group "senility" and ill-defined causes The probability of ultimately dying from a respiratory disease increases in old age, a tendency somewhat more marked with females than males

54 Between 15 and 20 per cent of the new-born will ultimately succumb to malignant neoplasms; for cardio-vascular diseases the proportions vary markedly between Europe and North America from between 40 to 50 per cent in Europe to about 60 per cent in North America. To put it differently, about one half of the new-born in Europe may expect to become a victim of a cardio-vascular disease; in North America, three out of five. Between 3 and 6 per cent of a cohort of new-born will die as a consequence of accidents. Under current mortality conditions, 5 per cent of a male, and 1 per cent of a female, birth cohort will ultimately die from cancer of the lung.

55 In several developed countries, rates of mortality from tuberculosis are now very low, less than 0 1 per 1,000. In the 25 years or so since the introduction of chemotherapy and (under cover of antibiotics) bolder lung surgery, rates have generally been reduced to a tenth of what they were, though there is still substantial residual morbidity, especially in older

TABLE 2. CHANCES OF ULTIMATELY DYING FROM SELECTED SPECIFIED CAUSES[a] AT SELECTED AGES, 1968

(Rates per thousand population)

Age	Males: Cardio-vascular diseases	Males: Malignant neoplasms	Males: Accidents	Females: Cardio-vascular diseases	Females: Malignant neoplasms	Females: Accidents
Europe						
0	431	191	50	487	161	36
1	443	196	51	497	164	37
10	446	197	49	500	165	35
50	457	197	28	510	155	32
60	447	182	24	514	137	32
70	406	143	22	493	109	33
North America[b]						
0	550	162	61	618	155	34
1	564	166	61	630	158	34
10	567	166	59	633	158	33
50	585	169	30	650	148	26
60	555	159	25	652	130	24
70	476	130	22	621	103	24

SOURCE: For composition of "Europe" and "North America", see United Nations *Demographic Yearbook 1970* (United Nations publication, Sales No. E/F.71.XIII.1). The countries included in this study comprise four fifths of the population of Europe and practically all of North America.

[a] The disease categories listed refer to the following detailed list positions of the 1955 revision of the ICD:

Cardio-vascular diseases: 330-334, 400-468
Malignant neoplasms: 140-205
Accidents: E800-E962

[b] Canada and United States of America.

persons with long-standing disease. It must not be forgotten that tuberculosis has been traditionally associated with poverty and that, even before chemotherapy, the rising level of living in the developed countries was already making a steady impact on tuberculosis mortality. A study of mortality from tuberculosis in the Maori and non-Maori population of New Zealand[25] has suggested that the socio-economic factor has become less powerful as this disease can now be cheaply and rapidly controlled in disadvantaged populations. Tuberculosis may, therefore, be quoted as an example of the success of medical advance in eliminating a socio-economic mortality differential.

56. In many developed countries the rate of mortality from cancer is about 2.5 per 1,000 for men and 1.8 for women. The rate has been increasing, and the greater part of the increase since about 1950 is due to the rise in mortality from cancer of the respiratory system. Few now question the assertion that this is the price—an increasing one—which people are paying for their cigarette smoking. Clearly, this is a field where health education has not yet succeeded; but one where, if it did, the dividend would be substantial. In the developed countries in general, the current death rates for cancer of the respiratory system are: males 0.30 to 0.50; and females 0.05 per 1,000. Australia has an immigrant and younger population and accordingly exhibits lower cancer mortality rates; in Mexico, the rates are low because fewer people survive to the higher age groups where the risk operates. For sites other than in the respiratory system, death rates (currently, 2.0 for males and 1.8 for females) are rising, but only very slowly.

57. As a disease, diabetes is often assumed to be associated with obesity and although with insulin therapy many people die with the disease rather than from it, the death rate may still be regarded as an indicator of relative affluence (since although obesity sometimes results from the high carbohydrate diets of the poor it is more often found in higher income groups). The diabetes death rate per 1,000 has remained at much the same low level in England and Wales from 1950 to date (males, 0.07; females, 0.12)—as low as the levels in the less affluent populations in Chile and Mexico. The rates are higher in other developed countries (of the order of 0.10 for males and 0.20 for females), especially for males in the United States of America (0.20).

58. The high rates of mortality for what may be regarded as a group of degenerative diseases (heart and circulatory disease, intra-cranial lesions of vascular origin, nephritis and bronchitis—the last included because of its association with heart disease through pulmonary hypertension) partially reflect the older age structure of the population. Even in Sweden, the model

[25] D. I. Pool and K. K. Chan, "Differential declines in tuberculosis mortality", *International Population Conference, London, 1969*, vol. II, pp. 1006-1012.

of low mortality, the death rates from this group in 1969 were: males, 5.8; and females, 4.9 per 1,000 It is significant that the mortality rate for males for this group of diseases has increased since 1950, while that for females has declined. The lower rates for the more recently developed countries are to be expected since, as yet, relatively fewer survive to older age groups where these diseases are prevalent The fact that so large a part of the total mortality of developed countries can be classed as degenerative indicates that future reduction in mortality will come not only from preventive medicine as it has hitherto been known, but even more from applied research into the aging process.

59. Ischaemic heart disease is occurring earlier, especially in males. Together with lung cancer, it accounts for the lack of any substantial improvement in the mortality of middle and older aged males The toll amounts to 3.0 per 1,000 in males and is increasing in most of the less developed countries. A great deal is now known about the aetiology of ischaemic heart disease. The risk is increased in people in relation to high blood pressure, obesity, diabetes, raised blood cholesterol levels, physical inactivity, impaired lung function and personality type. Cigarette smoking is related to mortality from ischaemic heart disease independently of all these factors. There is evidently still a massive problem of health education to be dealt with

60. Mortality from pneumonia and influenza is very low, due in part to early diagnosis which the adequate medical services ensure, and in part to timely chemotherapy. Pneumonia and influenza show peaks at the two extremes of life; older people with chronic respiratory conditions are at high risk during influenza epidemics or bad winter weather conditions.

61. The toll of accidental death for males is near or even exceeds 1 per 1,000. It is lower in England and Wales and in the Netherlands. In most countries, the rate for females is about 0 4 per 1,000, but it is much higher in the United States.

62. Looking at mortality at the later adult age (between 45 and 64 years of age) the changes in the cause of death pattern may be summarized as follows:

(a) *Ischaemic heart disease*

(i) *Males aged 45-54.* The death rate from this cause has risen steadily from 1950 to 1970 in many of the developed countries; in some of the European countries, by about one third over this period. Some part of this rise has been due to changes in certification practice as interest has become focused on arterio-sclerotic disease; there has, in many cases, been an apparent reduction in mortality from other forms of heart disease confirming that this interest has led to deaths, which would formerly have been certified as due to myocardial degeneration, more recently being assigned to arterio-sclerotic disease. In some cases where this inflation of the ischaemic heart disease rate has been exhausted, the rate has actually fallen slightly. But after taking account of all this, there is no doubt that the rise is of substantial proportion. However, in some countries the rise is now abating and in a very few cases a slight decline can be seen,

(ii) *Males aged 55-64* The rise in this age group has been about one fifth in 20 years. It appears in many countries to have levelled off; there is very little evidence of any decline;

(iii) *Females aged 45-54.* In most countries, the rate has tended to fall, if but slightly; but in a few countries, for example, England and Wales, France and the Netherlands, there have been signs of a recent rise,

(iv) *Females aged 55-64.* The picture here is much the same as for males at ages 55-64 Only exceptionally (for example, in Sweden) has there been any substantial decline,

(b) *Malignant neoplasms*

(i) *Males aged 45-54* In most developed countries, there has been a small decline in the period 1950-1970, a fall in the mortality from alimentary and genito-urinary cancer more than balancing the rise in mortality from cancer of the lung and bronchus,

(ii) *Males aged 55-64.* In this age group, any decline in the mortality from cancer of other sites has not been sufficient to outweigh the rise in mortality from respiratory cancer (for example, England and Wales) In countries where there has been little improvement in mortality from cancer of other sites, the over-all rise in cancer mortality has been substantial (for example, France). A very few countries exhibited a decline (for example, Sweden);

(iii) *Females aged 45-54 and 55-64* In many countries, there has been a slow decline; but in some countries, a slight upturn (for example, England and Wales).

(c) *Accidents and violence*

(i) *Males aged 45-54 and 55-64.* If anything, the death rates, which represent a substantial contribution to total mortality, increased slightly over the period 1950-1970 in both age groups;

(ii) *Females aged 45-54.* In many developed countries, the death rate from this cause, which represents only about one tenth of over-all mortality, has been increasing over the period 1950-1970; in Finland and the United States, for example, by about a third, and in the Netherlands and Sweden by about one half;

(iii) *Females aged 55-64.* In this age group, rather smaller but still significant increases may be observed.

Differences between population groups

63. Most of the available evidence on mortality differentials comes from studies in developed countries. Social class has been studied in several countries, using either occupation (and status and branch of industry) or education as summary index. The most definite demonstration of the social-class gradient comes from French experience. [26] Trends over time are difficult to analyse; but a blurring, if not a disappearance of a clear class gradient—while class differences remain—has been suggested. [27] Social-class differences in infant mortality have been observed in many countries and would be expected, having regard to the factors which influence the health of the new-born. Historical data demonstrate that the association with social class has been relatively unaltered by the general reduction in death rates, and class differentials persist in most countries. Studies have also shown that economic development is not alone sufficient, but that other factors, such as parental care and dietary habits, as well as biological factors (mother's age and parity, for instance) exert an influence, independently of economic development.

64. In many countries of advanced economic development, urbanization is so extensive (the Netherlands and the United Kingdom of Great Britain and Northern Ireland are extreme examples) that the environmental distribution between defined rural and defined urban areas (usually an administrative distinction) is of little significance. Medical services apart, the effects of urban localization of residence are probably secondary to those of socio-economic conditions. The lower paid worker must live near his factory chimney; the more highly paid executive may be able to afford to commute from open surroundings. The well-to-do can buy an escape to fresh air and few neighbours. In this light, a rise in *per capita* income appears to be a powerful factor in the reduction of mortality levels.

65. In a study of urban/rural differentials of mortality in the Federal Republic of Germany and Austria [28] the highest death rates were found for males in cities with a population of 1 million and more, whereas in females the rural areas had the poorest record. It was also shown that the urban/rural variation in mortality was more marked with males than with females. Males in large cities fared better than the average up to age 45; beyond that age, however, their mortality exceeded markedly the average as a result of the relatively high mortality from heart disease and lung cancer. First results of an ongoing WHO study, of changing patterns of urban/rural mortality in developed countries, appear to confirm these results on a broader basis. On the whole, male death rates for urban areas exceed those of rural areas, whereas no clear such pattern was found for females. Urban excess mortality is clear and systematic in both sexes for malignant neoplasms and appears unlikely to be accounted for by differences in completeness of reporting.

66. Income is indeed an important variable and is inherent in any social categorization. After this is taken into account, the residual contribution of other variables, such as occupation, housing, education and nutrition, has been found relatively small, though there is some evidence that certain cultural and social practices are independently of significance. [29] It would appear that affluence is not alone sufficient and that in addition to (and parallel with) economic development there remains a very large contribution to be made by education and cultural adaptation.

67. There remains also the problem of continuing rapid growth of population in some areas and the production of a high level of population density. It is of considerable interest, therefore, that a number of studies [30] have shown that any adverse health effects of population density are less due to overcrowding itself than to various manifestations of social disorganization and stress.

68. Evidence as to the effect of ethnic group, as such, upon health, is equivocal. There is some evidence of an effect apart from socio-economic factors, but there is also evidence that the mechanism may be the racial influence on income level.

69. Mortality differentials according to marital status are not entirely in a class apart since, in addition to a selection effect, the married generally enjoy greater economic security than the unmarried; but, nevertheless, income apart, the life-styles do differ if only in sexual behaviour and this is reflected in mortality differences. Among women, cancer of the breast, *corpus uteri* and ovary is more common in single women; on

[26] G. Calot and M. Febray, "La mortalité différentielle suivant le milieu social", *Etudes et conjoncture* (Paris), vol. 20 (ii) (1965), pp. 75-159.

[27] A. Antonousky, "Social class, life expectancy and overall mortality", *Milbank Memorial Fund Quarterly,* vol. XLV, No. 2, part I (April 1967).

[28] H. E. Hansluwka, "Unterschiede in der Sterblichkeit zwischen Stadt und Land in Oesterreich, 1959-1963", *Mitteilungen der Oesterreichischen Sanitätsverwaltung,* 68 Jg, 2 (1967).

[29] W. B. Nesar, H. A. Tyroler and J. C. Cassel, "Social disorganization and stroke mortality in the black population of North Carolina", *American Journal of Epidemiology,* vol. 93 (1971), pp. 166-175.

[30] H. E. Hansluwka, *Health, Population and Socio-Economic Development* (Liège, International Union for the Scientific Study of Population, 1974).

the other hand, cancer of the cervix uteri is more frequent in the married. Single males have a higher incidence of cancer of the buccal cavity, pharynx, larynx and prostate. Mortality from tuberculosis and some other infections is higher in single persons—though here disease may be the cause of non-marriage rather than the effect. There are more suicides among the unmarried. In general, married persons have the most favourable mortality. In the widowed, there is a bereavement effect (increasing mortality) which diminishes with the duration of widowhood. It has been suggested that the advantage of married over non-married has increased over time.

Prospects

70. The developed countries have become so accustomed to decreasing mortality that the current situation, having arisen in a period of broad economic and social progress, constitutes a major challenge for interpretation of its causes and its implications for the future. It was to be anticipated that the acceleration of gains in life expectancy observed in the first half of the century (as compared with the second half of the nineteenth century) cannot go on indefinitely and has, sooner or later, to give way to a deceleration. However, changes in male life expectancy between 1955-1959 and 1965-1969 at the later adult and old age were, as already mentioned, negligible or even negative for countries with a good record at the end of the 1950s, but were by no means restricted to them. Out of nine countries with male life expectancy at age 65 of less than 12.5 years in 1955-1959 (a relatively unfavourable record), five registered decreases in life expectancy, and in two, no change at all occurred.

71. Despite this word of caution, there can be little doubt that there is still a substantial potential for further improvements due to the elimination of inter-country and intra-country differentials, by ensuring that the best values recorded today shall become the average of tomorrow

72. First results of a comparison of projected and actual mortality trends in the past two decades, initiated by WHO, but not yet completed, lead to the following main conclusions

(*a*) The methodology applied was often poor and unimaginative,

(*b*) Reasonably good or over-pessimistic results (particularly when projections were based on the assumption of "constant" mortality) were obtained for females, however, most projections failed to anticipate the deceleration or even reversal of male death rates in certain age groups, particularly at the late adult and old age.

73. *In some countries, infant mortality has dropped* to close to, or even below, 15 per 1,000 live-born, and though at this level the pace of decline has decreased to a crawl of 0.1 per 1,000 per annum, with occasional upward fluctuations, progress still continues When one considers that with genetic counselling and extending planned parenthood there is a likelihood of much selective avoidance of high-risk births, an infant mortality rate within a range of from 5 to 10 per 1,000 may not unrealistically be assumed for the end of the century. In a country with the low level of Sweden, the resulting impact on life expectancy at birth will be negligible; in other developed countries with an infant mortality between 30 and 40 per 1,000, about two years of life may be added to life expectancy at birth.

74. Mortality at ages from 1 to under 15 is generally at a low level in developed countries. However, an inspection of the cause of death pattern at this age, with accidents ranking first and influenza and pneu*monia playing an important role, particularly at age* from 1 to under 5, suggests that further reductions should be feasible.

75. As to mortality at the adult ages, there is little evidence here to suggest any early or rapid decline in mortality from the causes which make up the major part of total mortality in these important age groups, though it is clear that the risks are, at least partially, preventable and could be speedily reduced if men and women were willing to accept the necessary discipline and could all live within an environment from which the current health hazards have been removed This latter condition is dependent upon social and economic *advance However, economic advance is not hazard*-free, indeed, though the level of living is rising in the developed countries, modes of life associated with affluence, as well as problems of the environment, pose new challenges

76 Barring major medical breakthroughs (or catastrophes), one may expect by the end of the century life expectancy at birth in developed countries to be within a range of 75-80 years, with females exceeding the value for males by about 3-5 years. This assumption appears to be substantiated by some hypothetical calculations. Assuming, for instance, that in a country such as Sweden, no deaths occur under the age of 50, male life expectancy at birth would be 76 years and the female equivalent would be 80. Of course, this is an extreme assumption, but indicative of what may be expected if efforts to prevent "premature death" con-

[illegible]

consequences of an elimination of particular causes, such as heart diseases, vascular lesions etc. (After all, the causation of death is more complex than the conventionally simplified classification of causes of death may imply.) None the less, it is a useful analytical tool if one bears in mind the limitations inherent in this approach. Elimination of accidents as a cause of death *would add less than two years to life expectancy* at birth. Gains of only a slightly greater magnitude would result from a conquest of malignant neoplasms. Comparatively greater is the gain which would result from a halving of cardio-vascular disease mortality [illegible] years). This group, therefore, stands out as [illegible]

element as concerns further substantial additions to life expectancy.

77. Assuming a life expectancy at birth of from 75 to 80 years by 2000 appears to be cautious in face of claims by the pharmaceutical industry of the world that drugs are becoming available to secure medicated survival far beyond this age. However, expectation of life is, to a large extent, influenced by causes which are environmental and of man's own making, so that the above mentioned estimate is a plausible compromise.

78. Implicit in the assumption of a life expectancy of from 75 to 80 years is the hypothesis that recent trends in adult and old-age male (and, to a lesser extent also, female) mortality will not seriously affect long-term prospects. However, additional analyses, such as, for instance, generation studies, are needed for a better understanding of the current situation, its determinants and implications for the future. Generation studies of lung cancer in some countries, for instance, appear to suggest that the peak has already been passed, the curves for the more recent generations being beneath the ones recorded for the older birth cohorts.

79. The current tendency in national projections to replace traditional "mechanical" techniques, based on variations of death rates over time and space assumptions about their future behaviour, by a more sophisticated "causal" approach which links mortality changes to the social, economic, political and medico-scientific environment, may lead to more "successful" projections. However, a sophisticated approach may not necessarily produce better results, especially when a multiplicity of factors determines the future.

80. Lastly, an increase in life expectancy must not be interpreted as a sign that the natural life span has been extended; it simply demonstrates that as a result of achievements in the social and medical field the number of people who live out their natural life span has increased. Whereas at the turn of the century, between 12 and 20 per cent of a birth cohort could look forward to reaching their seventy-fifth birthday, this proportion may now be estimated to range between 40 and 70 per cent. Understanding of the processes of aging acquires increasing importance and appears to be a prerequisite of any substantial extension of the "ultimate limit" of human life.

Summary

81. The widespread non-availability of the detailed results of the 1970 round of population censuses puts a severe limitation on the evaluation of recent trends, as well as on a comparison between actual and projected trends and the investigation of the reasons for their possible divergence.

82. However, even with these limitations, it is apparent that for less developed, as well as—to a lesser extent—developed countries, there still exists room for substantial reductions in death rates. Such factors as the politico-institutional structure, social and economic policy, protection of the environment, health education programmes designed to change patterns of life detrimental to health, and improvement of the health service infrastructure and the planning, management and evaluation of health policy measures, will determine the health trends in the future. Although the possibility cannot be excluded that in more developed, as well as less developed countries, further improvements in life expectancy will be achieved at a slower pace than in the period 1950-1970, it may well be that the retardation in the 1960s commented upon above was a period of consolidation after which the downward trend will be resumed. The potential for further gains exists. Values of expectation of life at birth ranging between 60 and 65 in less developed countries and 75 to 80 in more developed countries should be attainable by the end of the century for the vast majority of the population of these regions. However, as in the past, the future is man's own making.

Health, population and development

General perspective

83. Since the dawn of demography as a science, public health not only formed an important subject for demographic study, but stimulated and shaped, to a considerable extent, the development of demography. However, this relationship worked also the other way as public health owed (and still owes) much of its success to the application of demographic techniques and the use of demographic data for the design and evaluation of health programmes. Historically and today, the direction of research, and its concentration on any specific issue, has been a reflection of society's concern for a particular problem. For centuries, the primary determinant of population trends has been mortality (it still is in many less developed countries), fertility more or less reflecting society's response to prevailing mortality levels. Research, therefore, focused on the relationship between mortality and population dynamics. It is only a relatively recent development that the interrelationships between health and population are viewed from a wider perspective, encompassing the whole spectrum of health and population, i.e., to include the study of the interaction between health and population size and structure, as well as the interaction between health and the components of population change, mortality, fertility and migration.

84. The interrelationships between health, population and development constitute an area where still large gaps in knowledge exist. Many of the findings available are more of a suggestive nature than providing firm conclusions. The issues involved extend to a wide spectrum of different demographic, health and development problems and cannot simply be reduced to a review of any one particular situation. However, the growing concern of many less developed countries with the potential impact of rapid population growth on development efforts is reflected in the attention paid below to the interrelationships between health, popula-

tion and development in countries currently experiencing rapid population growth.

85. There is a growing awareness that "development" cannot be measured in economic terms only, but that the ultimate goal of development is the improvement of the quality of life and the provision for the best feasible satisfaction of human needs and aspirations. The problems of development cannot be solved by concentrating on particular economic or social programmes to the exclusion of others. Health, therefore, is an integral and essential component of the general development strategy. The purpose of this section is to review the potential contributions of health to the process of general development and to analyse the interrelationships between health and population trends In evaluating these potential contributions, it must be borne in mind that health is not independent of, but rather a reflection of, the social environment. Health problems cannot, therefore, be dealt with in isolation from other social, economic and institutional problems.

86. The role of health services in accelerating fertility decline in countries where family planning is promoted either for demographic-economic purposes or as a measure of enhancing family health and welfare is considered in some detail. Population policies are determined by individual Governments in the light of national problems and priorities. The WHO does not endorse any particular population policy but provides assistance, upon request, to member countries in the implementation of national population policies in all aspects within its technical competence.

Health and socio-economic development

Effects of socio-economic development on health

87. Evidence on the relationship between socio-economic status and health is well established in epidemiological literature. There are few major health problems about which some epidemiological information on effects of socio-economic status is not available. However, a more precise distinction of the relative importance of specific socio-economic cultural factors is very difficult to formulate, partially because of inadequate statistical documentation, partially because all these factors are functionally interrelated and operate within a given politico-institutional setting.

88 The increasing attention to the contributions of socio-economic variables to health improvement raises the question that perhaps health activities have been given more credit than they deserved for lowering mortality. During the long, comparatively slow process of development in most currently industrialized countries, economic development was probably more effective than public health and clinical medicine in reducing mortality, particularly in the early stages. Up to a certain extent, this contrasting of medical and socio-economic factors is artificial. During that time, advances in medical science and their application to the population could, on a large scale, not be effected independently of the stage of development of society. Measures of environmental sanitation, vaccination programmes, improvement of curative services and coverage of substantial parts of the population by an even rudimentary medical care system presupposed important centralized state functions and an administrative and political set-up conducive to socio-economic progress Even today, socio-economic development contributes significantly to the lowering of mortality in less developed countries In some countries, for instance, the current rapid decline in rural death rates cannot be attributed solely to organized health services because most village people do not have access to such services. Mass campaigns, such as malaria control and vaccination programmes, have, of course, also contributed importantly, but the precise balance in impact has not been defined. It is almost impossible to impute to any single factor of measure a definite return in terms of improved health

89. One of the crucial, but not yet satisfactorily explored, questions is whether disease eradication programmes accelerate a decline in mortality already under way—even if at a comparatively slow pace—or whether they can also set into motion a declining trend under conditions of a stable high mortality pattern. In the euphoria of the great successes of disease eradiction campaigns, particularly in the late 1940s and in the 1950s, it was occasionally asserted that the age-old tie between improvements in health, as shown in a decrease in mortality and levels of living, had been severed by the import of highly sophisticated medical technology independently of socio-economic progress. However, developments in the 1960s, where in a number of less developed countries, mortality reductions have fallen short of expectations and where differentials among less developed countries increased because of the uneven role of improvement, suggest a more cautious interpretation. It appears that a certain "take-off" into development is prerequisite to making the mass application of modern medical science and technology fully effective for the benefit of the country. Once the decline in mortality has set in, it may reach dramatic speed, far out-distancing progress in other social and economic fields until a threshold is reached, when socio-economic factors (in their broadest sense) assert themselves again and decide whether the decline of mortality can be sustained (either at all or at any rate) until the level of today's low-mortality countries is reached. It is also true that in the absence of adequate information, no firm conclusions can be drawn as to what extent reductions of death rates in less developed countries reflect genuine improvements in health.[31]

90. It must be realized that industrialization may lead to its own health problems if working conditions

[31] *Ibid.*

deteriorate and if there is an aggravation of environmental problems due to pollution and crowding, apart from the fact that in industrial countries the whole demographic spectrum and epidemiological climate is different from that in less developed countries. In developed countries, it is, above all, the degenerative chronic diseases and accidents, and many relatively mild, non-fatal diseases which are of public concern.

Effects of health on socio-economic development

91. While health workers have always taken for granted that health contributes to socio-economic development, doubts have been raised occasionally, largely because of concern about population growth. Recognition of the need to measure the strength of such relationships in comparison with the contributions of other developmental forces so that planners may have a better basis for allocating scarce resources has recently led to increased attention to health by economists. Research is still rudimentary, but there is indication that indirect effects are probably more important than direct effects. Data on the general relationships [32] indicated that health and education were the most evident among the large "residual" of factors that proved statistically more important than the usual economic indicators in explaining economic development.

Direct effects

92. The direct effects of reductions in disease incidence and prevalance can be summarized as follows:

(*a*) Opening up of previously uninhabitable areas for settlement and thus release of previously unusable material resources. Various studies [33] have examined the beneficial consequences of malaria, tryponosomiasis, schistosomiasis and yellow fever eradiction programmes on agricultural development, economic growth and the tourist trade;

(*b*) Reduction of the number of working days of the labour force, forfeited to diseases as expressed by statistics on absenteeism. [34] Here, too, it was shown, for instance, that reducing the prevalance of malaria and yaws has decreased absenteeism substantially;

(*c*) Boosting of labour morale and productivity. It is evident that a healthy person is likely to have a better working performance than a sick person, particularly someone suffering from an incapacitating serious illness. A recent annotated bibliography [35] lists many references of varying quality of data. However, much detailed research into the exact dimensions and specific magnitudes of such effects still needs to be carried out.

93. It is in countries (or areas) "where health conditions are worst that relatively simple and low-cost health programmes can produce dramatic lessening of the debility and disability of the labour force". [36] In these situations, major increments in productivity are most readily seen.

94. In addition to immediate effects of health on productivity, there is increasing evidence of potential delayed effects from malnutrition or illness occurring during the early development of children. It is clear that measurable deficiencies in several developmental indexes, including intelligence, can be attributed to early malnutrition and to deprivation of mother care. It is not yet clear how much and under what conditions a catch-up effect can occur.

Indirect effects

95. The indirect effects of health on economic development, real as they may be, are even more difficult to quantify. They may be broadly grouped under the following headings:

(*a*) A healthier population is likelier to include persons of "growth contributing activities" [37] i.e., dynamic persons capable of providing leadership or an active contribution to the development process be it as inventor, as *entrepreneur* or in any other capacity pertinent to the promotion of economic progress. "The required personal qualities are certainly multiple and probably have a synergistic action. However, there can be no doubt that health plays an essential part." [38] In a study initiated by the International Labour Organisation (ILO) on qualitative differences in the labour force, health (more specifically *per capita* caloric consumption) was found to be the factor most clearly related to differences in economic growth; [39]

(*b*) Better health, therefore, leads to a change in behavioural patterns and attitudes which are conducive to economic development. It has been argued that motivational changes are central to the process of economic development, and that effective health measures can be important in the creation of new attitudes and motivations among the poor. The importance of people as the active agents who accumulate capital, exploit natural resources, and build social, economic and political organizations is recognized to be basic to all national development. There is agreement on the general principle that healthier people tend to show more enterprise than those chronically

[32] H. Leibenstein, "Population theories, non-traditional inputs and interpretation of economic history", in P. Deprez, ed., *Population and Economics: Proceedings of Section V of the Fourth Congress of the Economic History Association* (Winnipeg, University of Manitoba, 1968).

[33] C. E. Taylor and F. Hall, "Health, population and development", *Science*, vol. 157, pp. 651-657.

[34] C. E. Taylor, "Health and population", *Foreign Affairs*, April 1965, pp. 475-486.

[35] K. Williams and others, *Health and Development: An Annotated Indexed Bibliography* (Baltimore, Department of International Health, Johns Hopkins School of Hygiene and Public Health, 1972).

[36] B. Benjamin, *loc. cit.*

[37] *Ibid.*

[38] G. Myrdal, *Asian Drama; An Inquiry Into the Poverty of Nations* (New York, Pantheon, 1968).

[39] W. Galenson and G. Pyatt, *The Quality of Labour and Economic Development in Certain Countries* (Geneva, International Labour Organisation, 1964).

sick. It has been suggested that ill-health contributes to the perpetuation of a high dependency ratio: parents wanting to ensure themselves of life's minimum necessities are significantly motivated to have large families so that on any given day, despite ill-health, a certain minimum number of family members are working. Therefore, improved health of those in or likely to join the labour force may well have an economic effect both in terms of increasing productivity and by increasing motivation to reduce family size.[40] Underlying all such discussions is the increasing appreciation of the basic rationality of family decisions and the fact that, in a subsistence economy, children are viewed as introducing very small marginal increases in cost. Perhaps the most important, but as yet unmeasured, attitudinal change associated with better health, is the individual's view of the future. As prospects for survival improve, both for adults and children, the future becomes worth planning for. When health measures are made available in a traditional community and at early stages of development, the benefits are sometimes so dramatic that a change in basic and often fatalistic beliefs may occur, which include a beginning understanding that natural phenomena can be rationally explained. Planning for the future becomes worth while when change is perceived as being possible,

(c) The role of health in economic development may be crucial, even though the direct impact is hard to quantify in cost/benefit terms, as shown by public health activities in nineteenth century England, where the underlying reason for public health programmes was the desire to concentrate political power in London.[41] This concentration of political power had far-reaching consequences for economic development.

Summary

96. Health, then, is in the equivocal position of being both a means and an objective of development. The World Health Assembly Technical Discussion on the Contribution of Health Programmes to Socio-Economic Development (1972) arrived at the following general agreement.

> "It was recognized as a basic principle that health programmes are rarely ever justified solely on economic grounds, but rather as the means of maintaining and improving health, which is perhaps the most important single factor in improving the quality of human life. It was accepted without question that health is an objective in its own right and represents one of the most important manifestations of social progress."[42]

[40] M. Perlman, "On health, population change, and economic development", in M Perlman and others, eds, *Spatial, Regional and Population Economics Essays in Honor of Edgar M Hoover* (New York, Gordon and Breach, 1972), pp 293-310

[41] *Ibid*

[42] World Health Organization, World Health Assembly, 1972, A/25, Technical Discussion 16, p. 6.

Health and population trends

97. Health interacts with both population trends and socio-economic development. In each case, health may be regarded as both a determinant and a consequence of the other Health also may tend to be an intervening variable in the interactions between population trends and development. Health status in a population influences all of the components of population change: it directly affects levels of mortality and morbidity; directly and indirectly affects levels of fertility; and has considerable influence on migration. In an effort to relate these variables, a model associating the demographic transition from high to low mortality levels with the epidemiological changes in the disease pattern has been developed[43] Discussion here focuses primarily on the two-way relationship between health and fertility.

Effects of health on population

98 The most obvious direct effect of better health is the reduction of mortality, which is the major force in population growth Equally often noted is the proposition that better health may increase fertility in the absence of family planning However, the contribution of this fertility effect to the growth of population should not be exaggerated It may result in a slight and transient increase in fertility while mortality is falling to less than half its former level

99. Nevertheless, there are several ways in which improved health can increase fertility The most obvious is elimination of diseases which reduce fecundity, such as tuberculosis salpingitis, endometritis and venereal diseases.[44] Low fertility due to high prevalence of venereal disease has been noted in a few countries. Better health can also increase fertility by reducing diseases that interfere with completion of pregnancy, such as infectious hepatitis, smallpox, tuberculosis, malaria, syphilis, listeriosis, brucellosis, toxoplasmosis and rubella It has been estimated that between 20 and 25 per cent of all pregnancies terminate in a spontaneous abortion[45] Malnutrition may contribute to maternal mortality, foetal loss, low birth weight and faulty lactation The fertile time-span may be increased by better health and nutrition, whereas famine conditions may lead to widespread amenorrhoea and seriously affect fecundity The total time-span during which couples are exposed to marital fertility may also increase due to decline in mortality of adults, especially when high maternal mortality is reduced

[43] A R Omran, *The Health Theme in Family Planning*, University of North Carolina Population Center monograph 16 (Chapel Hill, North Carolina, University of North Carolina, 1971)

[44] R H Gray, "Morbidity and population dynamics—the epidemiologist's approach", World Health Organization, Scientific Group on the Relation Between Morbidity and Population Trends, Geneva, 5-11 December 1972.

[45] F. E French, J. M Bierman and H L. Shapiro, "Probabilities of foetal mortality", *Public Health Report*, vol 77, No. 10 (1962), pp. 835-847.

100. Conversely, health and nutritional factors may lso serve to reduce fertility. For instance, prolonged ıctation due to health improvement can prolong post-artum amenorrhoea.

101. Changes in place of residence, or movement etween place of residence and place of work, are ariables which also influence the interaction between ealth and population dynamics.

102. It is worth mentioning that the provision of ıedical care does not invariably lead to better health, or are successful health programmes the only means y which health improvement may be achieved. A ıll discussion of the role of health and population in evelopment would need to deal with the contention f many that social structural change is fundamental) the attainment of community health. Development fforts obviously need to be multifaceted; however, the ocus of this paper is upon the contribution of the health ector.

'ffects of population on health

103. Population growth may contribute to the ggravation of health problems by pressure on the asic necessities of life. Because of the age dependence f morbidity and mortality, the age structure of the opulation is an important determinant of health prob-ems. There is also some evidence for a more indirect ıfluence of the age structure by way of an age ifferential in the utilization of health services. This ifferential cannot entirely be explained by the age ariation of morbidity, but rather suggests also an age ifferential in the perception of the need for health ıpervision.

104. It has been established[46] that the primary ause of the "aging" of a population is declining fer-lity. The low fertility levels, currently characteristic f many developed countries, have increasingly given se to concern for the social and public health implica-ons of a stagnant or declining population, an area onstituting largely *terra incognita*. A further important ıfluence factor is the spatial distribution of the popula-on. A thinly spread population may be exposed to ıadequate medical care, whereas overcrowding, articularly if coupled with poor environmental sanita-on and poor personal hygiene, may lead to serious ealth hazards.

105. The focus below is on a review of the growing ody of evidence that patterns of high fertility are ssociated with health risks to individuals, families and ommunities, a subject of topical importance for less eveloped countries.

Influence of large family and rapid child-bearing on the health of children

106. Abundant evidence has been accumulated howing that high parity directly affects the health of children. These subjects have been extensively reviewed recently.[47] The risks of stillbirth, infant mortality and child mortality are high with first births; they decline and then increase with parity after the fourth birth. These effects are seen most dramatically in less developed countries where all rates are high, but studies from the United Kingdom show that the differential rates persisted even after a significant mortality decline. Peri-natal and infant mortality were also related inversely to social class, but within each social class, the relationship to family size persisted.

107. Similarly, birth intervals had a clear effect on child health. When the interval between deliveries was short (less than one year), foetal, infant and childhood mortality were all increased. Useful evidence on this subject from a developing country comes from the Khanna Study in the Punjab. Neo-natal, infant and second-year mortality were highest when the birth interval was less than one year and tended to decline progressively with longer intervals up to four years. A major part of this effect was found in Africa to be mediated by weaning changes.

108. It must be reiterated that family size and birth interval are linked with multiple causal relationships and that unobserved mediating variables may be more important than those being observed. The height and weight of children has been shown to be inversely associated with family size. In France, India, the United Kingdom and the United States of America, studies with a variety of intelligence tests all showed that mean Intelligence Quotient (IQ) scores decreased with increases in family size, and that this effect persisted with social class. Similarly, a controlled study of children with manifest mental deficiency showed a positive relationship with increasing birth order.

109. Careful longitudinal studies have shown increasing incidence of common respiratory infections and gastro-enteritis with larger family size, presumably because of greater exposure. Lastly, Spence's classic studies in Newcastle-upon-Tyne (United Kingdom) showed a clear association between the quality of maternal care and family size.

Influence of parity and spacing on the health of mothers

110. Parity directly affects maternal mortality, with a steady and sharp increase in risk after the third birth. These differentials are most marked where obstetrical care is minimal. But higher morbidity due to toxaemia, placental disorders, malpresentations and haemorrhage continue to occur with grand multiparity even after improved obstetrical care has reduced mortality.

111. In relation to specific diseases, there are two studies which demonstrate an increasing prevalence of diabetes in association with increasing parity. It has also been observed that cancer of the cervix is

[46] V. Valaoras, *Patterns of Aging of Human Populations. 'he Social and Biological Challenge of our Aging Population* New York, Columbia University Press, 1950), pp. 67-85.

[47] A. Kessler and S. Kessler, "Health Aspects of Family Planning", paper presented at the Fifteenth Nobel Symposium, Stockholm, May 1970.

associated with parity, but, perhaps, the cause is more directly related to maternal age at first pregnancy.

112. At the other end of the spectrum, an above-average mortality of childless women has been observed.[48] However, childlessness is not a cause, but rather an indication of poor health (this holds not only for involuntary childlessness, but for those cases where family planning is practised for health considerations or fear of hereditary disease). Childlessness appears to be associated with cancer of the breast;[49] its association with poor mental health, however, is as yet not verified.

Influence of population pressure on community health

113. Tracing relationships between high fertility and health within families has proved difficult enough because of the large number of associated variables. When attempts are made to study whole communities, the evidence becomes even more controversial and judgements based on observational impressions tend to be substituted for data. A recent review[50] balances the evidence and concludes that the deleterious effects of crowding are mostly related to associated environmental considerations. The greatest risk seems to be to those newly entering the crowded conditions. More important than straightforward issues relating to the spread of infections is the social environment as a determinant of adaptation. Within a particular social environment, the quality of social interactions and the position within the group seem to be the most important influences on the adaptive process.

114. Many studies have shown relationships between crowding, housing and specific diseases, especially tuberculosis. The relation between population increase and the supply of food needs no reiteration. Even though a relationship has been found between large family size and schizophrenia, little can be said firmly about the mental health effects of crowding except for the gratuitous comment that human beings are remarkably adaptable.

115. *In sum, the health hazards of high fertility to* the individual, the family and the community are fairly large, and it appears reasonable to assume that if fertility can be reduced, for example, through family planning, then these health hazards would be lessened.

The influence of health services on family planning utilization

116. Whereas health services resulting in reduced morbidity and mortality have often been considered a major cause of population growth, the point will now be made that they can also contribute to a more rapid fall in birth rates through increasing the practice of family planning Three major groups of arguments are presented in support of this position.

Programme efficiency and effectiveness

117 There are obvious organizational benefits to be obtained by combining health and family planning services If integrated services are provided, then the maximum and most efficient use can be made of available supplies, equipment, transportation facilities, personnel and organizational structure

118. In addition, integrated services make more sense to families When a health worker visits homes, parents like to have multiple problems cared for rather than being put off by classifications of personnel which they do not understand In a clinic also, they would prefer to get their care from one person rather than a sequence Many family planning services have had minimal impact because of their inability to provide adequate follow-up to acceptors An effective and rational follow-up service can be most readily developed in conjunction with other health care services

119 Perhaps most important is the consideration that there are major benefits to be achieved by relating activities for which the public demand is equivocal to care programmes which are spontaneously and continuously in much demand Even though some families are eager for family planning because they have more children than they can care for, in general, the much larger number of low-parity parents who are demographically most important will continue to be somewhat ambivalent in their motivation. For these parents, it seems important to have a convincing case made for early spacing by a health worker whom they have learned to trust because he or she has provided continuing help for day-to-day illnesses Health workers are, however, not usually spontaneously interested in family planning and specific routines need to be established to ensure appropriate high priority and continuing attention

Relationship to maternal care

120. The international post-partum programmes have demonstrated that family planning acceptance is high during the post-partum period.[51] Family planning is especially effective when provided as a routine part of post-partum care because of the high motivation. When a gradual process of education is begun during the pre-natal care period, the mother accepts as perfectly natural the proposition that family planning should be begun after delivery to protect both her own health and the well-being of her child. Follow-up then is part of the routine. The reasons for high motivation at this time are not hard to identify. In addition to the health arguments, there are social, economic and

[48] P M. Hauser, "The determination of vital rates in the absence of registration data", *The Millbank Memorial Fund Quarterly*, vol. XLIX, No. 4, part 2 (October 1971), p. 191.

[49] R. Logan, "Marriage and childbearing in relation to cancer of the breast and uterus", *The Lancet*, vol. 265 (1953), pp. 1199 ff

[50] J Cassel, "Health consequences of population density and crowding", in National Academy of Sciences, *Rapid Population Growth* (Baltimore, Maryland, Johns Hopkins Press, 1971).

[51] G. I. Zatuchni, ed, *Postpartum Family Planning: A Report on the International Program* (New York, McGraw-Hill. Population Council, 1970)

time considerations relating to the difficulties parents would have in caring for the children they now have if another pregnancy supervened. In addition, there appears to be an important psychological consideration; having just passed through one pregnancy, mothers tend to want a period of respite before becoming pregnant again.

121. In some places, complications resulting from induced abortions may present a group of health problems strongly associated with the need for family planning. Abortion rates can reach equivalence with normal deliveries. Where they are performed under adequate professional control, complications are minimal. On the other hand, where abortions are carried out under unsafe hygienic conditions, surreptitiously and by poorly qualified persons, the results can be disastrous. For instance, in one country, it was estimated that 39 per cent of maternal mortality was attributable to abortion, and in one city, 42 per cent of puerperal deaths were due to abortion. In such circumstances, family planning programmes may be a major means of reducing the number of abortions.[52]

The child survival hypothesis

122. In recent years, increasing attention has been given to the proposition that the experience and/or expectation of infant and child mortality may hinder significant movement towards lower fertility in much of the less developed world. According to this view, as long as the proportion of children that die in childhood remains substantial, there is a major psychological obstacle to be overcome in promoting family limitation. Thus, significant reduction in child mortality may be an important, although perhaps not essential, means of encouraging an increased use of family planning in areas where both fertility and mortality are high. It would be expected then that efforts directed specifically towards the reduction of child loss and especially towards increasing the perception of greater child survival, although not guaranteeing fertility decline, could shorten the demographically important lag between the decline of mortality and fertility rates. At the same time, a health infrastructure that is developed for infant and child care can be logically and readily combined with other important services including family planning.

123. If the child survival hypothesis is important, it is apparent that its effect will be seen mainly in transitional situations where mortality decline is occurring while fertility decline lags behind. When conditions are so bad that high child mortality prevails, especially under famine conditions, then parents may practise family planning simply because they cannot afford or care for children. At the other end of the development spectrum, when conditions have improved so much that expectations of survival are generally high, then fluctuations of child mortality rates will have little effect on motivation for family planning. The fact is, of course, that the development problems are particularly acute in situations where the child survival hypothesis may be most relevant.

124. Possible reasons for such attitudinal interrelationships are readily mobilized. Children, and especially sons, are seen as a source of support in old age. The status of woman in some cultures depends upon whether she produces sons; and in almost all cultures, many of the satisfactions of family life derive from having children around as long as possible. Ensuring a replacement number of children depends upon the balance between reproduction and survival, and in terms of emotional investment there is probably more concern with the latter than the former.

125. Supporting evidence for the child survival hypothesis may be sought in two kinds of data: time series estimates of vital rates at national level to get a general feel for the probable direction and magnitude of quantitative and temporal association; and studies of couple experience which are undoubtedly of more value in trying to understand causal effects and the dynamics of interrelationships.

Association between birth and infant mortality rates at the national level

126. Little attention has heretofore been given to the pattern of relationship between infant mortality rates and fertility rates, despite earlier efforts, under the impetus of the theory of the demographic transition, to demonstrate such a relationship between general mortality and fertility rates. According to the child survival hypothesis, major declines in infant mortality should be followed after some lag by declines in fertility as couples perceive that their children are no longer dying in infancy. The levels of infant mortality and fertility over which the hypothesized effect occurs, the effect of the rapidity of the declines in infant mortality and the duration of the lag in fertility response are all subjects for empirical investigation.

127. In gathering information on the child survival hypothesis, it appeared worth while first to see what type of association could be defined in the timing of the two rates. Given all the limitations of currently available data, it was recognized that findings would be definitive only if inconsistent with the hypothesis and that even a strongly positive association would contribute mainly in suggesting what the magnitude and timing might be.

128. In a preliminary test of the relationships at the national level between fertility decline in the developing world since the Second World War and increased child survival, the association between crude birth rates and infant mortality rates as recorded in the United Nations *Demographic Yearbook* (1959, 1960, 1965, 1966, 1969 and 1970) for 53 countries in Asia, Africa and Latin America for each five-year period since 1945 has been analysed. Inclusion of a country depended

[52] M. B. Requena, "Social and economic correlates of induced abortion in Santiago, Chile", *Demography*, vol. 2 (1965), pp. 33-51.

solely upon whether relevant time-series data were recorded. It is recognized that these figures are suspect, but their deficiencies are mainly in under-reporting and there was more interest in timing and relative rates of decline than in infant mortality levels

129. From these data, three parameters have been computed for each country.

(*a*) The rate of fall of infant mortality rate from its highest value since 1945-1949,

(*b*) The rate of fall in crude birth rate from its highest value since 1945-1949,

(*c*) The interval between the onset of a decline in infant mortality or 1945-1949, whichever was more recent, and the onset of decline in crude birth rate since 1945-1949.

130. Because there are persuasive reasons for expecting the effects of rapidly declining infant mortality to be limited to those countries having high levels of infant mortality, and to vary by geocultural region, tests were also made separately for each of six regions and for high and low mortality classes for each of the five-year periods since 1945

131. As one corollary of the child survival hypothesis, the interval until the decline in fertility may be expected to be shorter where rapid declines in infant mortality are or have been under way. Table 3 reports the distribution of the mean rate of fall in infant mortality (IMR) and crude birth rates (CBR) by the interval between the onset in decline in infant mortality (or 1945-1949, whichever is later), and the apparent onset of fertility decline for the 53 countries Of these, in only one (Dominican Republic) was the post-Second World War decline in infant mortality interrupted by a temporary rise after the onset of fertility decline, but the relative levels of the two rates

TABLE 3 MEAN RATES OF DECLINE IN INFANT MORTALITY RATE AND CRUDE BIRTH RATE SINCE 1945-1949 BY INTERVAL BETWEEN DECLINE IN INFANT MORTALITY AND ONSET OF DECLINE IN CRUDE BIRTH RATE

Interval between decline in infant mortality rate and crude birth rate	*Number of countries*	*Rates of change since 1945-1949 in*	
		Infant mortality rate	*Crude birth rate*
<0 years	1[a]	−.0361	− 0178
<5 years	6	− 0496	−.0219
5-9	16	− 0373	− 0165
10-14	14	− 0353	− 0238
15-19	13	−.0327	− 0146
>20	3	− 0238	− 0000
Total	53	− 0367	− 0178

[a] fall appeared to precede the death rate fall, even though in 1950-1954 the crude birth rate was 44 0 and the infant mortality rate was 79.7

(IMR 79 7, CBR 44/1,000) suggested that infant mortality must have declined earlier. Among the other 52 countries, the shorter the interval between infant mortality decline and onset of *fertility decline, the* greater has been the mean post-war rate of fall in infant mortality, with a Spearman rank correlation coefficient of almost −1. For the 53 countries as a whole, the median interval to the onset of fertility decline, following 1945-1949 or the subsequent onset of mortality decline, is only 11.4 years The additional surviving births would, of course, tend to depress the crude birth rate by adding slightly to the denominator, but not enough to account for the changes observed. Only in three countries has the crude birth rate failed to decline during the post-war period. *Limited though* this test may be, it appears to support the hypothesis that the more rapid the fall in infant mortality, the sooner this will be followed by fertility decline Of course, it is possible that the relationship is not causal, that it is not declining infant mortality that causes fertility decline, but that both are caused by other factors

132 The notion that the greater the rate of fall in the infant mortality rate, the greater would be the rate of fall in the crude birth rate was also tested; but the results for this group of less developed countries in *the aggregate, or when controlling for mortality level* and region, were inconclusive

133 The ambiguity in defining causation from the results of such an analysis at the national level, especially since it is impossible to test all other relevant variables, emphasizes the importance of detailed small-scale studies of the sequential family-building process From the more complete data on small groups of persons, the effects of prior mortality upon subsequent fertility behaviour can be better studied

Detailed studies of variables associated with fertility and family planning

134. Six in-depth studies of the infant mortality-fertility relationship have been undertaken in six different geocultural regions. In addition, evidence bearing on this relationship can be found in several other fertility studies performed in association with action programmes Although the studies are not strictly comparable, because of differences in definition of variables and in methods of data collection and analysis, the comparisons presented here are based mainly on the direction of differences

135. The results of these studies are consistent in demonstrating a higher fertility associated with the experience and/or fear of child mortality, an association which is explained neither by socio-economic differentials nor in terms of the greater risks generally noted for higher parity children. Whether the dependent variable is desired family size, duration of birth intervals, contraceptive attitude or usage, parity progression, children ever born etc. these studies show that the experience of child loss has a significant positive effect upon subsequent couple fertility.

136. Some investigators have attempted to eliminate that portion of the relationship attributable to increased exposure to child loss from age, marriage duration, and/or greater number of births, analysing each parity separately or looking only at the effects of deaths in the first few parities.

137. That higher parity births are undertaken to replace early losses without changing the total number expected is supported by data on expected number of children reported by Adlakha. Here, over a variety of stratifying control variables, statements about expectations of completed family size were virtually identical for couples with and without mortality experience, despite a larger number of births reported by those with child loss.[53] It was shown that the experience of child loss had little effect upon the number of additional births expected when the number of surviving children had been controlled.

138. All studies are quite clear that among the couples experiencing child loss, attitudes towards contraception are less favourable, current usage is depressed and the timing of first use is delayed in comparison with couples without such loss. It is not until the fifth or sixth parity that the percentage of women with losses who adopt contraception approaches that among women without loss. Moreover, data from the Rural Health Research Centre at Narangwal in the Punjab indicate that the perception of increased child survival is associated with a rate of use of the more effective methods of contraception, which is nearly twice that of women who do not share such a view.[54]

Studies based on service programmes

139. As an incidental observation, it has been possible to extract from various sets of service statistics information which also related to the child survival hypothesis.

140. The Pathfinder Fund conducted a long-term comparative evaluation of the usage of intra-uterine devices (IUD) in a number of countries or areas. Among the questions asked of mothers coming to clinics, two were introduced relating to additional births desired and to previous child loss. These provide comparative information on additional births desired according to prior child loss in women attending IUD clinics in Hong Kong, Israel and the Philippines by parity. It must be appreciated that all of these women had come to the family planning clinics deliberately to defer births so that expressions of desire for additional births must be taken to have more meaning than in the usual household survey, even though the number of observations in some cases is very small. The major difference among them appears in the percentage desiring another child at parity 4. With child loss, the percentage desiring more children was almost double in Hong Kong and Israel; and in the Philippines, it was more than five times greater than for parents without child loss (table 4).

TABLE 4. COMPARISON OF ADDITIONAL BIRTHS DESIRED ACCORDING TO PRIOR CHILD LOSS IN WOMEN ATTENDING INTRA-UTERINE DEVICE CLINICS, BY PARITY AND LOCATION (INTERNATIONAL IUD PROGRAMME)

	Prior child loss			
	Women without loss		Women with loss	
Country or area + parity	Number of women	Percentage desiring another child	Number of women	Percentage desiring another child
Hong Kong				
0-2	475	66	2	50
3	400	22.8	13	46.2
4	324	7.7	28	14.3
5+	334	1.5	71	0
Israel				
1-2	461	80	6	66.6
3	508	52	14	50
4	283	25	31	45.2
5+	306	23.2	53	32
Philippines				
3	148	29.7	13	30.8
4	168	6.3	22	36.4
5	146	3.4	41	4.9

141. Similarly, studies in Africa can be cited. In rural Nigeria, it was observed that the study village was, in general, a somewhat poorer village than the control village; a major reduction in infant and child mortality had been achieved and the mean number of babies born and surviving was approximately one child greater than in the control village. It is of interest that five years after the initiation of the programme, but before an active family planning programme had been undertaken, a dramatic difference in additional births desired was recorded. In the study village, only four additional births were desired with a calculated desired completed family size of over nine. In the control, more than eight additional births were desired for a calculated completed family size of over twelve. The important question then is whether family planning practice will follow these statements about desired family size.

142. The beginning of a similar trend may have been under way in urban Lagos, where after only one year of operation of the Gbaja Clinic, some of the same differences were observed. A comparison between the mothers attending the under-five clinics and a control group found a greater percentage of the Gbaja mothers expressing awareness of increased child survival and approval of contraception.[55]

143. An a tea plantation in Bangladesh, it was shown over a period of 10 years, in a population of

[53] A. L. Adlakha, "A study of infant mortality in Turkey", unpublished doctoral dissertation.

[54] C. E. Taylor and H. Takulia, *Integration of Health and Family Planning in Village Sub-Centres*, report on the Fifth Narangwal Conference (Narangwal, India, Rural Health Research Centre, 1971).

[55] J. Wellman, "The Gbaja family health nurse project, Lagos, Nigeria, 1967-1970: an examination of its family planning impact", D.P.H. dissertation.

almost 40,000, that the infant mortality rate was brought down from over 60 per 1,000 live births to 40, and maternal mortality from over 7 to less than 2 per 1,000 births Without any deliberate family planning programme excluding access to the national programme, the birth rate also dropped from 40 to 30 per 1,000 population. A possible explanation is that the birth-rate fall was indirectly influenced by the maternal and child helath programme

Discussion

144 Despite the close agreement of the findings from these studies, the effects in many cases are not very large. It remains difficult to evaluate the long-run demographic effect of reductions in infant and child mortality To the extent that couples are either over-compensating for child loss or having additional "insurance" births, increased child survival would tend to reduce couple fertility and population growth rates The argument has been made that, to the extent that couples fail to replace fully their losses, increased child survival would tend to increase population growth, assuming no change in family size norms and desires This argument is irrelevant to the practical situation because it would be impossible in any to achieve a one-to-one replacement In the first place, continuing child loss itself introduces a compound interest type of geometrical progression, with any replacement itself experiencing further loss. Secondly, it would be unreasonable to claim that replacement desires would override all other considerations as a motivational force It is only one force in a complex matrix with an equally important force being the relative degrees of unwantedness of children. There is undoubtedly, then, a spectrum ranging from lower parity children who are lost even though wanted and are therefore partially replaced, on to children at higher parities whose births go beyond family expectations and here the tendency to replace would be minimal. The important issue is where on this spectrum does practical decision-making lead to the practice of family planning. At a developmental level, where from eight to nine children are born and only from three to four survive, as in many African villages, replacement desires may be adding from two to three births. Where an average of four children are born and three survive, the potential replacement desire would undoubtedly be less. As child mortality declines, the subconscious expectation of death would also decline, but after a lag period.

145 The ambiguity of the purely demographic impact is reflected in some of the modelling exercises which simul
assumptions
intervals. In t
assumptions are made, and the effect of mortality decline may be to increase or decrease growth rates depending upon the set of values chosen for the demographic parameters. Simulation models incorporating assumptions about son-survivorship represent an effort to go beyond demographic considerations, to evaluate the influence of mortality decline upon a motivational concern common to many cultural areas.

Interactions between health, population and development

146 Having described broadly the ways in which health is both a determinant and a consequence of population increase, it is important now to attempt a balancing of the relative strength of the interactions in the development process.

Balance of forces influencing population trends

147 The following generalizations must be applied with appropriate flexibility to local situations A tentative sequence is traced representing stages at which particular forces become most evident, but it must be reiterated than these are overlapping and variable in their impact

(*a*) In many less developed countries there is a considerable latent demand for family planning. Some parents already have more children than their personal or financial resources can provide for and they are eager for better means of family planning It is postulated that merely by providing family planning services, birth rates can be brought down to the mid-30s, with a family planning utilization level by eligible couples of about 15 per cent which can be raised to over 20 per cent with an intensive programme,

(*b*) In the countries experiencing fertility decline most recently, it appears that the lag between falling mortality and fertility is being shortened. Thus, whereas a general decline in birth rates followed declining death rates (especially child mortality rates) by *a period of over 50 years among most countries of* the developed world, the lag recently appears to have been reduced to less than 25 years. It is postulated that to the extent that improved health services contribute to further declines in infant and child mortality, they will also accelerate declines in fertility, although there is probably a threshold when birth rates reach the low 20s, beyond which the effects of maternal and child health and survival as forces influencing fertility will be superseded by other forces. From the limited evidence now available from field research, the indirect attitudinal effects of improved health on family decisions may be more potent than the direct physical effects. Expectations of child survival appear to be part of a subconscious orientation towards the future, based in part on the mortality experience of siblings and friends during each individual's own childhood as supplemented by more recent family and community experiences Field trials combining child care and family planning programmes are under way to see if awareness of survival can be made a conscious decision variable as parents see that their children are being provided continuing care. In a study in the Punjab, about 40 per cent of eligible couples are actively using family planning with the curves still rising,

(c) In the past, demographic shifts occurred slowly and spontaneously as an indirect result of socio-economic development and better nutrition. It is likely that the first effect of economic development is merely to permit parents to have the greater number of children that their pro-natalist traditions would encourage. The eventual close association between better economic status and low fertility appears mainly to have been mediated through secondary attitudinal changes associated with modernization and the increasing ability of parents to plan ahead for their families. Such an orientation is clearly influenced by education, social and political developments, availability of resources and better health. As general socio-economic and political stability improves and spontaneous family aspirations rise, a society comes to accept the idea of family planning in response to felt needs for health. Direct use of economic incentives to influence family planning motivations might then become a possibility. In any case, through the spontaneous action of socio-economic forces, birth rate will eventually move on down to some kind of balance with a stabilized death-rate level of 10-15, as has been the experience of countries which have already achieved economic modernization;

(d) Lastly, there are potent demographic and socio-economic forces which must be recognized and allowed for in planning, but which can be less readily changed or used in family planning programmes. For instance, there are strong taboos and belief patterns which persist as underlying forces influencing behaviour and psychological responses. It is of some interest that most demographic and social science research has focused on this kind of underlying variable which cannot be readily changed. Certainly, population education should begin now to promote awareness of demographic trends because the effects will probably be long range.

Balance of forces influencing health

148. Health improved historically mostly as an indirect effect of socio-economic development. Health services have become increasingly effective, but their application is still often linked to socio-economic development. Demographically, the most significant mortality changes in developing countries still result from improved maternal and child survival, the latter by reducing common infections, such as diarrhoea and respiratory infections in synergistic combination with malnutrition.[56] These improvements depend upon personal health care, rather than mass environmental measures. However, it has to be borne in mind that declining mortality should not be considered the sole criterion of improved health. The almost complete lack of reliable information on morbidity and on indexes of positive health, however, makes it difficult to define these relationships with any precision.

149. Most countries face difficult choices in balancing the investment of money and manpower that is to be applied to the economic, as compared with the social, welfare components of over-all development. There is increasing recognition that the maldistribution of income, which is so evident when purely economic development occurs, must be compensated for by investments in minimum services which are increasingly considered basic human rights. High on any such grouping of rights are a basic level of health services and nutrition.

150. An integrated service package of simple and increasingly effective health care and family planning provided by auxiliaries in a regionalized network can facilitate demographic adjustments while directly contributing to the social components of general development. Such a combined programme can be practical, constructive, immediately applied, relatively inexpensive, and will probably have particular appeal to political leaders.

Generalizations relating to development of health and family planning programmes

151. A series of simple broad generalizations is presented below to crystallize some issues important to policy and planning; they deal both with causal interactions and programme implications:

(a) The momentum of change has become the greatest force for change in most countries. The expectations of all peoples have risen to the point that demand for a better quality of life represents a dominant force both within nations and in international relations;

(b) International programmes will have to be adjusted to the aspirations and special circumstances of recipient countries. Specifically, the balance of emphasis between three main groups of justifications for family planning—economic, social justice and health—will have to respond to a mosaic of country-specific planning. Population policy must be determined by individual Governments;

(c) The following stages in programme development, based on the forces described above, provide a basis for programme planning:[57]

(i) Meeting existing demand for family planning in situations where no such services have been available. Every society has parents who are eager for help in limiting family size because of economic, health and social reasons. They use abortion or any other method available. Obviously, programmes must begin by providing modern methods of family planning to this group. When modern methods are made available, the first wave of acceptance is usually due to substitutions for traditional methods.

(ii) Integrating health and family planning services. For the long hard process of building effective services,

[56] N. S. Scrimshaw, C. E. Taylor and J. E. Gordon, *Interactions of Nutrition and Infection*, World Health Organization monograph series No. 57 (Geneva, 1968).

[57] C. E. Taylor, "Five stages in a practical population policy", *International Development Review*, vol. 10, No. 4 (1968), pp. 2-7.

more and more countries are integrating health and family planning services. Great efficiencies can be achieved through the integrated use of facilities and manpower. Help with health problems produces confidence in health workers, which leads to acceptance of advice on family planning and provides for follow-up. In addition, the need for family planning is most evident to parents and community leaders in conjunction with events in the reproductive and child-care cycles. A two-way interaction has been defined—family planning is a potent way of improving maternal and child health, and, conversely, maternal and child health will facilitate family planning utilization.

(iii) Utilizing changing economic influences in family planning programmes. To influence the acceptance and *continuing utilization of family planning, there have* been imaginative efforts to use economic incentives and constraints. These work best with procedures that have the finality of sterilization; they have not worked thus far with other family planning methods Some experimental programmes probably will end up being as expensive as integrated family planning and health services. Economic choices in daily living become a more significant force as economic conditions improve and more planning options open. A pattern of planning ahead in daily living may represent an increasingly critical factor in fertility decline, especially as birth rates reach low levels;

(iv) Utilizing changing socio-cultural influences in family planning programmes. Consistent use of family planning in most cultures requires major adjustments of long-standing values and practices Long-term education to a new fertility pattern should be begun early For the short-term, it is probably simpler to concentrate on changing practices rather than values. Changes in the role of women, especially their education and employment opportunities outside the home, obviously become important as social conditions change. In general, however, such value change is more likely to be a resultant rather than initiating cause of social change.

Conclusions

152. The interactions among population increase, health status and socio-economic development are complex Although the effects are difficult to measure, there is no question that improved health status for individuals and communities both facilitates socio-economic development and is itself one of the goals of that process Moreover, there appears to be little doubt that socio-economic development has been accompanied by a slowing-down of the rate of natural increase, *although the influence of population growth upon the* development process is by no means clear-cut and depends upon the socio-geographical and temporal context.

153 In those situations in which the effect of rapid population increase is considered harmful to development, investment in the health sector, despite its obvious desirability, has come in for serious questioning, because of the role of health services in decreasing mortality and thereby accelerating population growth. The child survival hypothesis, however, suggests that infant mortality decline may be a necessary step towards increased family planning motivation and consequent fertility decline

154 It has been the thesis of this paper that basic health services, including family planning, are an important component of socio-economic development in so far as they result in improved health status, and that where early fertility decline is considered crucial for development, family planning services are most effective when integrated with maternal and child health programmes

PROTEIN/CALORIE DEFICIENCY AND CHILD HEALTH

Vasilios G. Valaoras *

1. Protein is taken as the foundation of human diet. The real importance of proteins lies in the fact that they are components of every cell in the body and are constantly subject to wear and replacement. Nitrogen and sulphur, the two essential elements of cellular protein, are present only in the highly complex molecules of the various kinds of food protein, which must be taken daily and in sufficient amount, if the growth and the integrity of living tissue are to be preserved.

2. During the process of digestion, proteins are broken down into amino acids, some 22 different forms of which have so far been identified. Eight of these (isoleucine, leucine, lysine, menthionine, phenylalanine, threonine, tryptophan and valin) are shown to be essential to the maintenance of the nitrogen equilibrium, and they cannot be manufactured from other amino acids in the human body. Proteins containing these amino acids are therefore considered to be of higher biological value. In the ensuing reconstruction of protein molecules of human type, all the essential and many of the non-essential amino acids must be present in the blood circulation at the same time, if synthesis of the protoplasm is to be complete. Proteins or amino acids are not stored in the body, apart from the tissues or fluids they form; and in case of emergency, living tissue, and especially that of the muscles, is wasted in order to preserve the vital functions of the body.

3. Proteins of several types are found in almost all articles of food that are consumed by man. In general, food of animal origin (milk and dairy products, eggs, meat and fish) contains more of the essential amino acids than those derived from plants (grain and seeds, vegetables, fruits etc.). An adequate supply of this high-quality protein must be present in everyone's daily ration; and it is absolutely indispensable for growing children, pregnant or lactating women and convalescents.

Food requirements and the effects of calorie-protein deficiencies

4. All the various nutrients for human populations are usually found in sufficient amounts in the daily food and only in exceptional circumstances, shortages of one or of a small group of these nutrients may occur, leading to specific deficiency disease (mostly avitaminosis). Much more common is a general form of malnutrition, in which food intake falls short of that required to maintain energy and of the correct proportion of protein, especially when that of animal origin is not sufficient to cover physiological needs. The resulting morbid condition appears first among children whose growing bodies exert heavier demands for both total calories and high-quality products. This situation is reviewed in this chapter.

5. Food requirements for human populations differ considerably in accordance with the sex, age, profession, metabolic rhythm and status of health of each individual, in addition to the general norms of adaptation of a population to its particular environment, including the annual and seasonal average temperature, the amount and the kind of food produced and several other characteristics. A further complication derives from the fact that the nutritive value of dietary protein varies in accordance with its source, that contained in eggs or milk being the best with respect to its effect on the nitrogen balance of the body. Still another factor is the proper utilization of protein, for when there is a deficient intake of energy-producing carbohydrates and fats, part of the dietary protein is used to provide energy, instead of meeting the protein needs of the organism.

6. In an attempt to overcome some of the difficulties, nutritionists have reverted to an imaginary "reference adult man or woman", moderately active and weighing 65 kg and 55 kg, respectively, to whom are respectively assigned a total of 3,000 and 2,000 Calories per day. Against this "reference", food requirements for a population can be roughly calculated, taking into consideration the composition of the various food items available for consumption as well as the energy (in Calories) required by the various segments of the population, with respect to sex, age, occupation etc.

7. The most recent expert committee on nutrition established by[1] which met in Rome from 22 March to 2 April 1971, re-examined the whole question of energy and protein requirements in the light of more recent data. Some of its conclusions are:

(*a*) In planning nutritional programmes, it is essential, first, to ensure adequate levels of energy intake;

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[1] World Health Organization, *Energy and Protein Requirements,* report of a Joint FAO/WHO *Ad Hoc* Expert Committee, WHO technical report series, No. 522 (Geneva, World Health Organization, 1973).

otherwise, part of any additional protein supplied to meet estimated protein needs will be used to provide energy instead;

(*b*) The share of the three main energy nutrients—carbohydrates, fats and proteins—depends upon the family budget; and as income rises, the proportion of energy derived from fats increases and that from carbohydrates declines, and only the proportion supplied by protein appears to be independent of wealth and stands at roughly 11 per cent of the total food intake,

(*c*) The energy requirements depend upon several interrelated variables, including physical activity, body size and composition, age and environment, against the conventional "reference man or woman" aged between 20 and 39 years, who is healthy and fit for active work on a moderate scale, the energy requirements (expressed in calories) of children and adolescents are, on the average, as shown in table 1.[2]

8. As expected, energy (calorie) requirements increase with body weight (which, in children, is a function of age). The requirements per unit (kilogramme) of weight decrease with advancing age in accordance with the declining rate of growth from infancy to childhood and then to adolescence, as shown in the figure given below.

[2] World Health Organization, "Energy and protein requirements", in *WHO Chronicle*, vol 27, No 11 (November 1973), pp 481-482

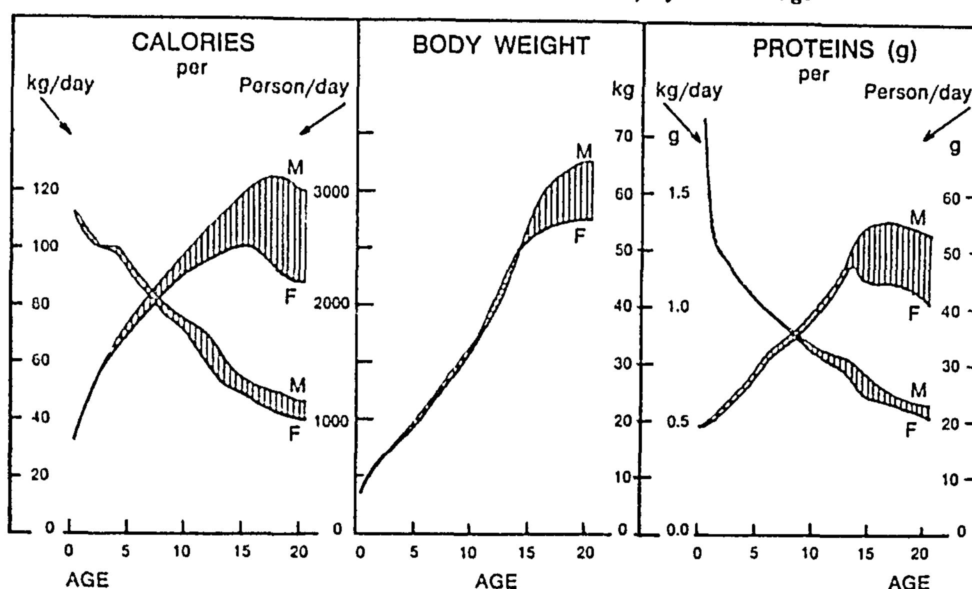
9. Against this basic framework, which guarantees an adequate supply of energy during infancy and childhood, protein requirements of children by sex-age groups, vary as shown in table 2. These estimates are based on the factorial method, which takes into account the replacement of nitrogen lost daily in human excreta (urine, faeces, sweat etc) plus the amount of nitrogen needed for the formation of new tissue The factorial values were increased by 30 per cent in recognition of the fact that even with an excellent protein source, such as milk or eggs, larger amounts of nitrogen are needed to secure nitrogen equilibrium or maintain growth than the amount calculated by the factorial method. The values so obtained are estimates of the average physiological requirement, and a value that is 30 per cent above the average would provide an allowance needed for individual variation and represents the safe levels of nitrogen intake Since most proteins contain about 16 per cent nitrogen, the factor 6.25 was applied to convert safe levels of nitrogen intake to safe levels of protein intake. The last two columns of table 2 represent a correction for protein quality, reflecting their composition in essential amino acids. On the basis of a 100 per cent score, given to egg or milk protein, the score 80 per cent reflects the usual average diet in developed countries where the protein intake is made up of a mixture of animal and plant origin. A 60 per cent score represents the average diet of poor countries, where the proportion of protein of animal origin is low

TABLE 1 ENERGY REQUIREMENTS (EXPRESSED IN CALORIES) OF CHILDREN AND ADOLESCENTS BY SEX AND AGE

Age (Years)	*Body weight (kilogrammes)*		*Calories per kg/day*		*Calories per person/day*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*
Reference[a]	65.0	55 0	46	40	3 000	2 200
<1	7.3	7.3	112	112	870	820
1	11.4	11.1	103	106	1 180	1 180
2	13 6	13.4	100	100	1 360	1 350
3	15.6	15 4	100	99	1 560	1 520
4	17.4	17.5	99	96	1 720	1 670
5	20.7	20 0	91	90	1 870	1 790
6	23 2	22 4	87	85	2 010	1 900
7	25 9	25 0	83	80	2 140	2 010
8	28 6	27.6	79	76	2 260	2 110
9	31.3	30 4	76	73	2 380	2 210
10	33 9	33.8	74	68	2 500	2 300
11	36 7	37.7	71	62	2 600	2 350
12	40 2	42.4	67	57	2 700	2 400
13	45.5	47 0	61	52	2 800	2 450
14	51.7	50.3	56	50	2 900	2 500
15	56 6	52 3	53	48	3 000	[illegible]
16	60 3	53 6	51	45	3 050	[illegible]
17	62 4	54 2	50	43	3 100	[illegible]
18	63 7	54 6	49	42	3 100	[illegible]
19	65 0	55.0	47	40	3 [illegible]	[illegible]

SOURCE. World Health Organization, "Energy and protein [illegible], vol 27, No 11 (November 1973), pp. 481-486, table 5.
[a] "Reference" adult man or woman, moderately active.

Body weight, caloric and protein requirements per kg/day and per person/day during infancy, childhood and adolescence, by sex and age



Note: Protein requirements at balanced mixed diet of 70 score.

or negligible. It is interesting to note that protein requirements, per kilogramme of body weight, are almost four times as high in infancy as in adulthood, and that a daily *per capita* intake of between 0.5 and 1.0 gramme of protein per kilogramme of body weight is sufficient to cover the physiological needs of all those who are beyond early childhood.

10. Looked at from this angle, the problem of feeding the world population would appear not too difficult, since current production of food is more than enough to meet these requirements. However, the real picture is quite different. Authoritative reports from many regions of the world indicate that "a large proportion of the children, probably one third, mostly from poor income population groups, are indeed known to suffer from protein deficiency", [3] and moderate or severe forms of protein-calorie malnutrition (PCM) are found in a percentage ranging between 0.5 and 20.0. In general, the proportion of children with either a severe or moderate form of PCM is one of the order of 19 per cent in Latin America, 26 per cent in Africa and 31 per cent in Asia. [4] Estimates put the number of undernourished children in the developing countries of the world at 276 million in 1968; it will reach 329 million by 1975. This means that 50 per cent of children in the pre-school age range and 30 per cent of school-age children suffer from protein-calorie malnutrition. A United Nations report states:

"Today there are over 300 million children who, for lack of sufficient protein and calories, suffer grossly retarded physical growth and development, and in many instances, mental development, learning and behaviour may also be severely impaired. Protein-calorie deficiencies also directly affect the health and the economic productivity of adult populations." [5]

11. The term protein-calorie malnutrition (PCM) includes many different clinical syndromes, the most severe forms of which are nutritional marasmus and kwashiorkor. The former results from deprivation of protein and calories to a similar degree, while the latter is due primarily to a protein deficiency in relation to energy intake, which may stand at the required level. Protein-calorie malnutrition is an important cause of infant and early childhood mortality, stunted physical growth, low work output, premature aging and reduced life span in the developing world. Its widespread occurrence may spell a grave danger to the full expression of the genetic potential of the population of large sections of the world community. [6]

12. Nutritional marasmus, the most common form of PCM, hits hardest during pre-school ages and especially affects recently weaned children at about the second year of life. Since it is caused by shortage not only of protein, but of calories and other nutrients, the administration of protein alone for prevention or treatment is a wasteful and rather futile procedure. It is also clear that provision of additional calories,

[3] P. V. Sukhatme, "Contribution statisticians can make in determining nature of the food problem", International Statistical Institute, *Proceedings of the Thirty-eighth Session, Bulletin of the International Statistical Institute*, vol. XLIV, book 1, p. 191 (Washingon, International Statistical Institute, 1971).

[4] J. M. Bengoa, "The state of world nutrition" (unpublished).

[5] *International Action to Avert the Impending Protein Crisis* (United Nations publication, Sales No. E.68.XIII.2), p. vii.

[6] *Strategy Statement on Action to Avert the Protein Crisis in the Developing Countries* (United Nations publication, Sales No. E.71.II.A.17), para. 1.

TABLE 2. SAFE LEVELS OF PROTEIN INTAKE BY SEX AND AGE AT YOUNG AGES, ACCORDING TO THE PROTEIN QUALITY OF THE DAILY DIET[a]

	Body weight (kilogrammes)		Safe level of protein intake (Grams per kg/day)		Safe level of protein intake (Grams per person/day)		Adjusted for lower quality of protein, per person/day: Score 80[a]		Score 60[a]	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
months	9.0		1 53		14		17		23	
years	13.4		1.19		16		20		27	
years	20.2		1 01		20		26		34	
years	36.9	38 0	0 81	0.76	30	29	37	36	50	48
years	51 3	49 9	0 72	0 63	37	31	46	39	62	52
years	62.9	54 4	0 60	0.55	38	30	47	37	63	50
	65 0	65 0	0 57	0 52	37	29	46	36	62	48
nt woman, later half of pregnancy						+ 9		+11		+15
ng woman, first 6 months						+17		+21		+28

ɔURCE: World Health Organization, "Energy and protein requirements", *WHO Chronicle*, vol 27, No. 11 (November table 8.

Scores are estimated by comparison of the protein habitually consumed to that of eggs or milk, the score of which was 100.

ut ensuring adequate protein intake, is of limited

But the question remains as to why the food ce-sheets which take into account both food bility and the estimated average requirements y fail to *guarantee a proper nutrition of the child* ation. Several answers are given to explain this pancy. The allowances shown in tables 1 and intended to cover the needs of healthy individuals not those of persons exposed to chronic or rent acute infections, who need significantly in- ed *allowances of protein, energy and other* nts. Furthermore, absorption of protein may also duced by the action of intestinal parasites

. Maldistribution of the available food within l and economic population groups and among y members is another explanation for the observed malnutrition For example, food available within a y may be consumed disproportionately by adults often not enough of the food that is richer in in is left for the children or other vulnerable ly members, such as the sick or pregnant or ting women. For these reasons, *per capita* food nutrient availability figures can be quite misleading. direct examination of feeding practices and health litions of family groups can give the desired mation, but surveys of this nature are expensive time-consuming. However, all available information ts to the *fact that malnutrition* in general, and cially the child-oriented protein-calorie malnutri- , appears to be the most prevalent malady in the ld today; and, in view of the existing gap between rates of population growth and food production, situation is likely to get worse in the next few ades.

PROBLEMS OF MEASUREMENT

15. Indirect but undeniable evidence from areas oughout the world indicates that protein-calorie malnutrition is widely prevalent, probably afflicting at least one third of the world population. It is more common among children of the developing countries, but it is also found in other countries where food supply appears adequate Yet, the problem is not well documented by statistical findings, and malnutrition, as a direct cause of death, seldom if ever is mentioned in official vital registration Malnutrition is a deadly malady, usually complicated by a terminal syndrome of diarrhoea or enteritis, an infectious disease or broncho-pneumonia, and one of these is given as the *cause of death instead of malnutrition*

16 Preliminary findings of an extensive survey, conducted by the Pan American Health Organization in Latin America,[7] show that, in early childhood mortality, malnutrition is given as an underlying cause of death in 7 per cent and as an associated cause in 46 2 per cent of all deaths in that age group (0–4 years) By age and type of malnutrition involved, the percentage distribution of these deaths is as follows:

Protein-calorie malnutrition	Under 1 year	1-4 years
Kwashiorkor	4 6	31 3
Nutritional marasmus	25.7	17 9
Other forms	69 7	50 8
Total	100 0	100 0

Thus, kwashiorkor, which is due to protein shortage in a diet of about full caloric value, appears mainly in babies in the post-weaning period, while general malnutrition (protein and calorie deficiency) is responsible for more deaths during both infancy and early childhood

[7] *Pan American Health Organization*, "Inter-American investigation of mortality in childhood", provisional report (Washington, D C, Pan American Health Organization, Pan American Sanitary Bureau, Regional Office of the World Health Organization, 1971), as quoted by J. M Bengoa, *loc cit.*

17. A persistently high infant and early childhood mortality, which sometimes appears to resist ameliorations occurring in the public health field, is undoubtedly linked with a poor level of nutrition. In many developing countries, the proportion of deaths in the age segment below the age of 15 stands at the high level of 50 per cent or more of deaths at all ages, despite an ever-increasing public effort for better maternal and child care. In some of these cases, significant declines in the death rate do occur in infancy and late childhood, but not in the pre-school group (1-4 years of age). A deficient child nutrition is the only plausible explanation of this phenomenon, and mortality in the second year of life (when breast-feeding usually stops) is correctly proposed to serve as a more reliable indicator of the nutritional level of a population.

18. Other attempts to attribute a deficient rate of body growth in childhood to deficient nutrition yield equally unsatisfactory answers. Comparisons of average values of height and body weight by sex and age, against some given standards of body growth during infancy and childhood, may err on several counts. There is no known standard that is readily applicable to all population groups of the world; and there are many factors, besides nutrition, which affect the rate of growth of the individual child. Racial or genetic and environmental variants, previous diseases and the manner in which each child is reared within a large or a small family, a rich or a poor community, are factors as equally important as nutrition is in this respect. Furthermore, malnutrition is not always due to a general shortage of food in the community at large. Low *per capita* income, illiteracy, low cultural level and poor sanitary conditions, and racial or religious prejudices often lead to a wasteful use of available food of high nutritive value and consequently to an unnecessary and wholly preventable malnutrition.

19. Only large-scale sample surveys, conducted by responsible organizations in the most vulnerable areas of the world, could give more reliable data on the prevalence of malnutrition in various countries. Such surveys are expensive, time-consuming and extremely difficult to carry out (for example, there is not as yet an accepted clinical symptomatology for detecting the mild forms of malnutrition which are the most extended and therefore the most harmful), and inquiry as to the exact prevalence of malnutrition in the world will probably remain unanswered for a long time to come. However, in view of the pressure of public opinion to know the real magnitude of the problem, it is preferable to use the best information available—even if it is still unsatisfactory—in the hope of counteracting the usually distorted pictures, some of which over-estimate while others underestimate the problem of protein-calorie malnutrition as it exists in the world today.

THE PROTEIN CRISIS

20. Among the several dozen nutrients that are needed in man's daily food intake, high-quality protein is the least abundant and therefore the most expensive. High-quality protein, containing all or most of the eight essential amino acids, is mainly manufactured within the bodies of (domestic) animals, which mature slowly and are poor converters of natural energy into food. In this respect, plants are more efficient and agricultural potentials are far greater since proteinaceous food from plants can be produced in shorter time intervals and in sufficient quantity to meet the daily needs of humanity. The root of the problem lies, therefore, in the relative scarcity of high-quality protein in the rapid rate of growth of world population, which is not always matched by an equally rapid rate of increase in food production. Projections of current trends reveal that protein-calorie deficiency will almost certainly become more acute, unless effective action is soon taken in time and on a global scale to reverse this trend.

21. Data on the net food supply *per capita* in recent years (1965-1969), published by the United Nations,[8] show that the average daily ration of food falls short of standard requirements in about two thirds of the countries mentioned there. A condensed extract of this information is given in tables 3 and 4. Thus, in 80 out of 128 countries (62.5 per cent), the amount of daily food is too small, since its energy-equivalent is less than 2,500 calories per person/day. Qualitative deficiencies are also evident, because the average daily intake of total protein is less than 80 grams per person in about 75 per cent of the countries compared, and the participation in the diet of food of animal origin is also short in about the some proportion.

22. In the report of the Advisory Committee on the Application of Science and Technology to Development, submitted to the United Nations Economic and Social Council in July 1967, the nature of the problem is stated as follows:

> "World food production is falling behind population growth despite all current national, bilateral and international efforts to reverse this trend. Providing food to meet calorie needs is not sufficient. Adequate protein is also required for the normal maintenance of body tissues and functions, and additionally for growth, maturation, pregnancy, lactation and recovery from injury and disease. Supplies of protein are particularly scarce and costly for the population of developing countries. With the exception of calories, the required quantities of the other essential nutrients, such as vitamins and minerals, are very much smaller in comparison and usually easier to supply."[9]

23. The main emphasis is given to the shortage of protein and its morbid effects on the general population, but particularly on the growing children:

[8] *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72.XVII.1), pp. 504-509, table 160.

[9] *International Action to Avert the Impending Protein Crisis.*

TABLE 3. DISTRIBUTION OF COUNTRIES ACCORDING TO FOOD INTAKE PER PERSON/DAY, EXPRESSED IN CALORIES AND PERCENTAGE OF CALORIES OF ANIMAL ORIGIN

Calories of animal origin [a] *(grams)*	*Countries with an average calorie intake of*				
	1500—1999	*2000—2499*	*2500—2999*	*3000+*	*Total*
<10	7	42	2		51
10-19	6	22	11	2	41
20-29	2	1	6	3	12
30-39			6	5	11
40+			3	10	13
Total	15	65	28	20	128

SOURCE: United Nations, *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F.72 XVII 1), table 160.
[a] Calories (percentage) of animal origin include meat, eggs, fish, milk, cheese, butter, slaughter fats and marine oils.

"The gap between the nutritional requirements and the actual consumption of protein by the greater part of the population in the developing countries is widening rapidly . . . Protein-calorie malnutrition not only increases susceptibility to acute and chronic infections, but also causes a compensatory reduction in the capacity for physical activity and promotes apathy. These direct effects on adult populations impede the economic productivity and development of countries, which are desperately in need of improving the status and potential of their peoples, quite apart from the human suffering involved.

"The growing nutritional deficiencies have even greater impact on young children in developing countries. In some countries, as many as one third die before reaching school age and for most of the survivors, physical growth and development are impaired. Moreover, there is increasing evidence of associated retardation in mental development, learning and behaviour, due in particular to malnutrition in early childhood. Thus the nutritional deficiencies existing at the present time in many developing countries already are jeopardizing the future for many millions of the world's people." [10]

[10] *Ibid*, paras 12-13.

24. For the formulation of a strategy to combat current deficiencies and to avert the impending protein crisis, a special Panel of Experts on the Protein Problem Confronting Developing Countries, convened at United Nations Headquarters from 3 to 7 May 1971, recommended the following actions. [11]

25. Recognizing the fact that "there is no simple solution to the protein problem" and that "the most [illegible] ticular population groups, if the serious and often irreversible damage to the physical status and mental capacity of the emerging generation is to be avoided

26 The responsibility for the development of a sound nutritional programme remains clearly with society as a whole, but international involvement is also required at least for some developing countries The largest volume of the needed additional protein must come from conventional animal, plant and fishery sources, because these are currently the most acceptable and desired food. Action should therefore be primarily directed towards

(*a*) Promotion of increased quality and quantity of animal and vegetable protein crops suited for direct human consumption;

(*b*) Improvement in the efficiency and broadening of the scope of marine and inland fisheries, including fish farming;

(*c*) Prevention of losses of proteinaceous foods in the field, farm and store.

27. In view, however, of the existing limitations to large expansion of conventional sources of food, the following supplementary actions were also recommended:

(*a*) The utilization of oil-seeds and oil-seed protein concentrates in order to increase the quantity and quality of protein, available for direct consumption;

[11] *Strategy Statement on Action to Avert the Protein Crisis*, paras 14 and 17.

TABLE 4. DISTRIBUTION OF COUNTRIES ACCORDING TO PROTEIN INTAKE, BY CONTINENT

(Grams per person/day)

Grams of protein	*Number of countries*				
	Africa	*Asia*	*Americas*	*Europe* [a]	*Total*
<40	2	1	—	—	3
40-49	8	6	7	—	21
50-59	12	10	5	—	27
60-69	11	7	10	—	28
70-79	8	5	1	4	18
80-89	—	—	—	12	12
90+	—	2	4	13	19
Unweighted average (g)	57 9	59 9	63.7	89.1	66.7

SOURCE United Nations, *Statistical Yearbook, 1971* (United Nations publication, Sales No. E/F 72. XVII.1), table 160
[a] Including Australia, New Zealand and the Union of Soviet Socialist Republics.

(*b*) The development of fish protein concentrates;

(*c*) Increased production and usage of synthetic amino acids;

(*d*) The development of single-cell protein from yeasts, leaves, algae etc., and its utilization, either for feeding farm animals or for enriching food items directly consumed by man.

28. Before closing this section on ways and means designed to meet the impending protein crisis, a note of caution appears to be in order. Unless the rapid expansion of world population is checked in good time, the above-mentioned proposals, even if fully implemented, will still fall short of the desired goals.

Demographic implications

29. Protein-calorie malnutrition is already a world-wide affliction, causing incalculable damage to humanity. People of all ages and both sexes fall victim to this ever-present scourge, but infants and young children together with pregnant or nursing mothers pay the heaviest toll. The highest infant and childhood death rates occur in countries where malnutrition is widely prevalent and children in the pre-school age (1 to 4 years old) are exposed to risk of death 50 to 70 times higher than those with normal diets. Children who survive the ordeal of chronic malnutrition are likely to sustain irreparable damage with respect to their body growth and the development of their mind and behaviour. The adverse effect of malnutrition upon the size, composition and quality of population can hardly be over-emphasized.

30. That malnutrition is the hidden cause behind the excessive infant and childhood mortality observed in many of the developing regions of the world cannot be seriously disputed. So is most of peri-natal mortality and the high incidence of prematurity linked with maternal malnutrition. Such mortality is likely to resist public health efforts for the control of infectious diseases, because malnutrition appears to be more deadly than any of the other childhood diseases. Only when concomitant measures for improved nutrition are simultaneously applied will this profuse wastage of life be effectively checked.

31. Malnutrition has been proven to be an equally potent obstacle to social efforts to reduce excessive fertility. Many well-designed family planning programmes fail to achieve their objectives, for lack of co-operation from the parents. Faced with repeated loss of their children, parents are reluctant to accept the advice or to use the means for reducing family size, until they see for themselves that live-born children can survive through the perilous period of infancy and early childhood. The best results are obtained through the application of a sound programme of better nutrition, together with those directed against infectious diseases and poor sanitary conditions. Malnutrition therefore stands as a barrier to sound population policy designed to reduce both excessive premature mortality and excessive fertility.

32. A direct corollary of high birth and death rates, as sustained by the prevalence of malnutrition, is the stagnation of the population in an immature age composition. In such a case, there are too many children in proportion to the adult population in the working-age group, and the resulting heavy dependency burden precludes any saving and capital formation on which accelerated productivity and economic development are mainly based. Poverty, ignorance and low levels of living are the unavoidable companions of an underfed community.

33. International co-operation is therefore absolutely necessary, if malnutrition—the most formidable enemy of humanity—is to be brought under effective control.

NUTRITION, MOTHER'S HEALTH AND FERTILITY

*Samuel M. Wishik and Susan Van der Vynckt**

1. Throughout the world, there is a fundamental concern with the widespread failure of the development process to reach the people most in need. There is a push among Governments and international agencies to treat the chronic problems of under-development: disease, rapid population growth, malnutrition, illiteracy, underemployment and inadequate food resources

2. Planners are beginning to realize that if they persist in attacking each problem in isolation, only limited progress can be made towards the common goal of all intervention programmes—improvement of the quality of life

3. The aggregate is the job Piecemeal efforts not only can fail to reach their short-term and long-term goals, but might even become counterproductive Thus, reducing infant mortality through improved health and nutrition means more mouths for the family to feed immediately and more persons to house and clothe Yet, merely reducing the number of births will not ensure the parents that their children will survive, nor make education accessible to the children.

4. Heretofore, attempts have concentrated on the separate symptoms rather than on the complexes in which the symptoms interact Health, nutrition and fertility form an interacting complex that determines the well-being of the family. Programmes in each of these areas share the common goal of family well-being. Integrated efforts for programme promotion appears logical.

THE PROBLEM

5. Industrially developed countries have all attained low birth rates, a status gained by means of the well-known three steps of the demographic transition—high mortality and high birth rates; lowered mortality with continuing high fertility and consequent rapid population growth; and low fertility as well as mortality. It is generally accepted that countries now still in the first and second steps will eventually reach the third pattern in conjunction with improved literacy, levels of living and general development The questions at issue are the time it will take, whether that time can be shortened and how it might be done.

6 Most of the less developed countries are not facing mere recapitulation of the history of the demographic transition. Their current circumstances differ with respect to such factors as already having achieved a large absolute population base and being exposed to pressures for rapidly closing the visible gap between themselves and more advanced countries The answer seems to lie in telescoping the time span remaining before the end-point of higher socio-economic status and slower population growth and bolstering the interval through world collaboration and support.

7. The interim should be a period of expanded education, health promotion, nutrition improvement and lower fertility Such betterments derive from social sources combined with individual action, the latter especially prominent in people's dietary practices and fertility behaviour At least, societies should give families the options for wholesome eating and for individual control of fertility The topic of this paper is whether those two options can be made more accessible, acceptable and attractive by an integrated nutrition-fertility approach.

8. It is contended that nutrition intervention without fertility modification, or fertility modification without concern for nutrition, can have only limited success—that, in fact, such programmes may be scientifically questionable, socially unreasonable and programmatically ineffective—even in short-range terms. Joint nutrition promotion and fertility modification programmes are essential For the longer term, programme impact on the larger development goals may be far greater if the programmes are integrated from the beginning

FERTILITY AS INSURANCE AGAINST CHILD LOSS

9. Social demographers (and others) have long believed that acceptance of family planning in developing countries will not occur until a significant reduction in infant mortality has been achieved.[1] This "child survival hypothesis" states that once child loss rates decline, parents will perceive that fewer pregnancies are necessary to guarantee desired family size. If more children are surviving, the initial effect is in-

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[1] A Berg, *The Nutrition Factor: Its Role in* ... *onal Development* (Washington, D C., ... Brookir ... itution, 1973) R. Freedman, *The S* ... *Hu* ... *ity, A Report and Bibliography* (O ... la ...

creased family size and population growth. [2] The theory postulates that in a later period, the population growth rate will decrease due to purposeful fertility control by the parents. This hypothesis must be tested on a large scale in order to identify the "time lag" from the achievement of rising infant and child survival to the lowered fertility rates associated with awareness of increasing family size. [3]

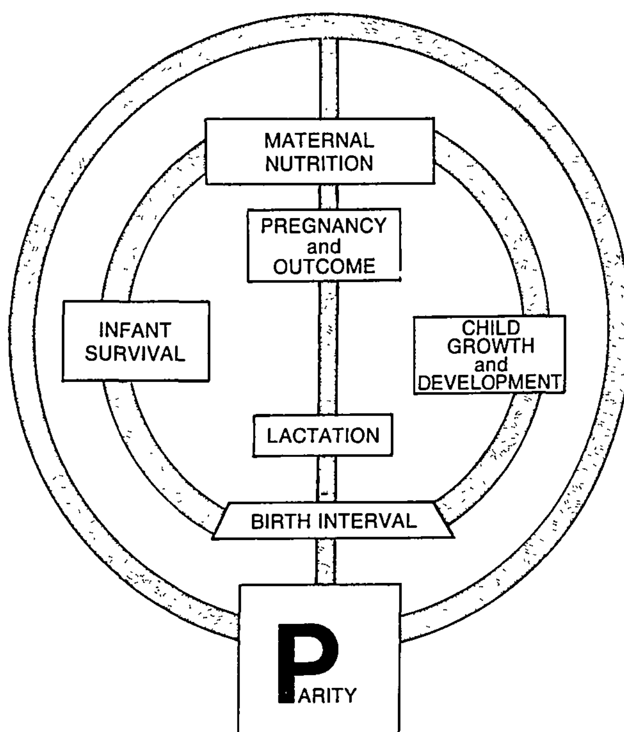
10. The implication of the child survival hypothesis is that programme intervention should proceed first from improved health and nutrition which will enhance survival chances, then with family planning education to make women aware that fewer pregnancies are possible and then to the offering of means of controlling unwanted pregnancies. Such a simplistic palliative is subject to two seemingly opposite criticisms, yet without disagreement with the basic importance of infant mortality in the total question. One is the obvious fact that mere excess of children over the family's capacity to care for them has not prevented marginal societies from having extremely high fertility. The key is not just awareness of the disadvantages of excessive family size, but the incompatibility between that situation and access to opportunity for the family's betterment. That opportunity must be real and visible. Among most deprived peasantry of the world, the family with three children is hardly less hungry than the neighbouring family with 10. Moreover, housing in the rural areas appears to have an inexhaustible capacity to absorb families as they grow. A strong element of social and economic improvement is an essential piece in the programme intervention mosaic. Research is needed to learn just how purposeful lowered fertility behaviour is and to understand the dynamic sequence of motivational change at different levels of deprivation and opportunity in relation to different risks of child loss.

11. The second and apparently opposite criticism contends that, without the need for a psychological or motivational explanation at the family level, it is infant mortality that shortens lactation, vitiates cultural taboos against abstinence and places women in a continuous state of reproductive effort. The very concept of protecting the pregnancy-free interval tends to disappear and the changed attitude spills over to encompass even a more fortunate surviving infant in need of care. Physiological elements of this picture and the nutritional implications are considered at length later in this paper.

BASIC RELATIONSHIPS BETWEEN NUTRITION, HEALTH AND FERTILITY

12. The relationships between nutrition and fertility are interactive and cyclic. Therein lie the difficulties in attempting to delineate the direction of cause and effect and to measure discrete components in the complex interrelationships. Even in a simplified analysis, two directions must be considered and an attempt made to tease the elements apart—the effects of nutrition upon fertility and the effects of fertility upon nutrition (see figure I).

Figure I. Basic relationship between nutrition and fertility



The effects of nutrition upon fertility

13. Nutritionists have long studied and have produced a rich literature on the effects of a woman's nutritional status upon the likelihood of conception and the course and outcome of pregnancy. [4] Serious

[2] J. D. Wray, "Will better nutrition decrease fertility?", paper presented at the Ninth International Congress of Nutrition; Symposium on Nutrition, Fertility and Reproduction, Mexico City, 3-9 September 1972.

[3] A. R. Omran, "Health benefits of family planning", Maternity-centred family planning paper (Geneva, World Health Organization, 1971); C. E. Taylor, "Health and population", *Foreign Affairs*, April 1965, pp. 475-486; C. E. Taylor, "Five stages in a practical population policy", *International Development Review*, vol. X, No. 4 (1968), pp. 2-7; C. E. Taylor, "Population trends in an Indian village", *Scientific American*, vol. 223, No. 1 (1970), pp. 106-114; C. E. Taylor and M. Hall, "Health, population and economic development", *Science*, vol. 157 (1967), p. 651; C. E. Taylor, J. S. Newman and N. U. Kelly, "Health aspects of population trends and prospects" (E/CONF.60/CBP/26); H. Frederiksen, "Feedbacks in economic and demographic transition, *Science*, vol. 166 (1969), pp. 837-847.

[4] J. G. Chopra and others, "Maternal nutrition and family planning", *American Journal of Clinical Nutrition*, vol. 23, No. 8 (1970), pp. 1043-1058; J. P. Habicht and others, "Relationships of birthweight, maternal nutrition and infant mortality", *Nutrition Reports International*, vol. 7 (1973), pp. 533-546; R. W. Hillman and J. E. Hall, "Nutrition in pregnancy", in M. Woho, and R. Goodhard, eds., *Modern Nutrition in Health and Disease*, 4th ed. (Philadelphia, Lea and Febiger, 1968), chap. 39; "Nutritional Supplementation and the Outcome of Pregnancy", Proceedings of a Workshop, 3-5 November 1971, Sagamore Beach, Massachusetts, National Academy of Sciences, 1973; "Maternal nutrition and family planning

complications of pregnancy, delivery and puerperium can be attributed to nutritional aberrations of women during pregnancy.[5] Among the offspring, congenital malformations, birth weight, constitutional strength, defenses against disease, growth and development and chance of survival may be modified by the mother's pre-natal nutritional state.[6]

The effects of fertility upon nutrition

14. The focus of this paper is more on the opposite direction of the nutrition/fertility relationship. the question, "How does fertility—the frequency, timing and circumstances of childbearing—affect the nutrition of women and of their children and therefore their health and lives?". For this purpose, it is necessary to keep constant in the analysis the all-pervading socio-economic determinants and also to raise certain still somewhat theoretical questions about women's variable physiological readiness to meet the physical demands of pregnancy and childbirth at different points in their childbearing years. The interplay between theoretical considerations and factual experience has implications for programme intervention.

Pregnancy during the post-adolescent years

15. With respect to the span of childbearing, possible instances of "excess fertility" might be expressed as: "too soon, too late and too many". "Too soon" refers to the post-adolescent overlap with pregnancy before the woman has reached an age that may be optimum for childbearing The unfavourable mortality and morbidity statistics among such young mothers and their children are evident for all times and places. Those outcomes have been attributed to assumed endocrinological and anatomical immaturity with respect to reproduction, coupled with the composite nutritional demands of continuing growth and pregnancy.

16 That the phenomenon is not entirely physiological, however, is clear Childbirth among women in their late teens is becoming progressively less hazardous is modernized countries In less developed countries, on the other hand, the greater maternity risk below 20 years of age persists[7] The differences may reflect better obstetrical care, as well as general socio-economic improvement In a study[8] done 30 years ago by one of the authors, in Hawaii, of first births among the youngest group of mothers (15-19 years), comparison between those in and out of wedlock during the pregnancy revealed a threefold differential in pregnancy wastage after the first trimester and a sevenfold discrepancy in their having obtained a reasonable minimum of ante-partum care The social definition of "illegitimacy" carried with it built-in barriers to health resources.

17. The problem is particularly applicable to less developed countries because of the earlier age of marriage and of first pregnancies that prevails Not uncommonly, the extended family counts the months that elapse following a consummated alliance before a pregnancy proves the bride's worth In some cultures, pregnancy is a pre-condition to marriage, just as it so often leads to marriages for legitimization in westernized societies. In the latter, added phenomena are the dramatic secular trend to earlier menarche and the tendency to earlier marriage and first birth among some groups in recent years. In any event and in all countries, the importance of giving special attention to the nutritional improvement of adolescent girls cannot be overemphasized Policy and programme efforts must also devise effective ways of delaying the age of first nancy, ways that are culturally appropriate societally feasible.

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in the Americas", report of a Pan American Health Organization Technical Group Meeting, Scientific publication No 204, 1970, E Siegel and N Morris, "Epidemiology of human reproductive casualties, with emphasis on role of nutrition", in *Maternal Nutrition and the Course of Pregnancy* (Washington, D C, National Academy of Sciences, 1970)

[5] L. Bergner and M. W. Susser, "Low birth weight and

10-12 January 1974, J St. George, E H St. John and D Josa, "Factors influencing birth weight in normal pregnancy", *Journal of Tropical Pediatrics*, September 1970, C. Yarbrough and others, "Influence of gestational nutrition on birthweight and other outcomes of pregnancy", paper presented at the 1973 American Public Health Association Meeting, San Francisco, California, November 1973.

[6] R. E Klein, J. P. Habicht and C. Yarbrough, "Some methodological problems in field studies of nutrition and intelligence", in D. J D. Kallen, ed, *Nutrition, Development*

performance", paper presented at Workshop on Latent Effects of Malnutrition and Infection during Pregnancy as Determinants of Growth and Development of the Child, held in Guatemala, 10-12 January 1974, J. P. Habicht and others, "The timing of the effect of supplementation feeding on the growth of rural preschool children", paper presented at the Ninth International Congress of Nutrition, Mexico City, 3-9 September 1972; A. A Albanese, ed, "The effect of maternal nutrition on the development of the offspring", *Protein Advisory Group Bulletin*, vol III, No. 3 (1973), p. 38, United States National Center for Health Statistics, *Infant Mortality Problems in Norway*, Public Health Service publication No 1000, series 3, No 8 (Washington, D C, United States Department of Health, Education and Welfare, 1967).

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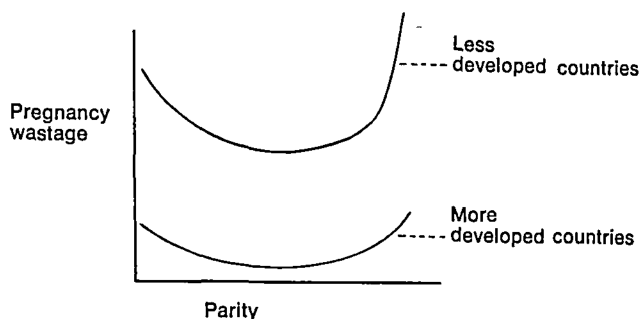
[8] S M. Wishik, "Study of utilization of health service ... illegitimate young mothers", Master of Science thesis, Territory of Hawaii, Ministry of Health, Maternal and Chi... Health Division.

Pregnancy during the pre-menopausal years

18. Similarly, at the other end of the childbearing years, the term "too late" refers to the contention that conception continues to occur past an age that is optimum for mother and child. There is no finding more consistent than the correlation of pregnancy complications and unfavourable outcomes with advanced maternal age. The hazards associated with pre-menopausal pregnancies are universally recognized.

19. This question of "too late" is closely tied to the problem of "too many", since the highest parity orders must cluster at the later years. Advanced age or high parity, each taken separately, adds risk; together, the jeopardy is compounded.[8] A number of study findings on the dangers of high parity deserve mention, although the separation out of interrelated variables, such as age, is not always satisfactory in the research designs. Women of higher parity are more prone to anaemia[9] and to lower weight-height ratio.[10] Children in larger families, especially with more pre-school-age children, or of higher birth order, suffer more from malnutrition, grow more slowly, are more anaemic,[11] have impaired mental development[12] and are offered diets that are poorer in calories and protein and that use less *per capita* expenditure.[13] Admittedly, socio-economic differentials correlate with the higher parity and consequently with the greater frequency of unfavourable sequelae.[14] How much does the disadvantage derive from parity and how much from economic deprivation? Some data on this are given below. To some extent, it must be the combination that constitutes the offending agent. Figure II shows that when the

Figure II. Pregnancy wastage rates



high pregnancy wastage rates in many less developed countries are compared with the loss rates in the more favoured countries, the U-shaped curve becomes shallower as well as lower.[15] The extra jeopardy, especially at the upper end, is reduced.

20. The lessons are clear. Health and nutrition of mothers at the upper end of the childbearing years or of parity order need special protection as long as complete avoidance of pregnancy is not assured at those ages. The goal of contraceptive protection in these groups of women would appear to be a reasonable concurrent target. In the large majority, these women have attained or exceeded their desired family size. They are not expected or required by the family to produce more offspring, nor is their hierarchical status dependent upon continued childbearing. Many a woman is ready to settle into an abstinence relationship with her husband if permitted and even welcomes or encourages other sexual outlets for him, such as in concubinage and prostitution. The pressures to such alternatives with possible or at times implicit social dislocations might be lessened by fuller access to acceptable and reliable contraception. For the older age groups, surgical sterilization is an obvious solution that warrants emphasis in fertility modification programmes.

Close birth spacing

21. To the possible fertility excesses thus far discussed must be added that of "too close together". Birth spacing can be looked at in terms of the three major components of the "closed interval" between successive pregnancies, as shown in figure III.

22. Recent thinking rejects the traditional concept that pregnancy constitutes a stress upon the woman's

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[9] P. S. Venkatachalam, "Iron metabolism and iron deficiency in India", *American Journal of Clinical Nutrition*, vol. 21, No. 10 (1968), pp. 1156-1161.

[10] P. S. Venkatachalam, "Study of diet, nutrition and health of the people of the Chimbu Area, New Guinea Highlands", monograph No. 4, Department of Public Health, Territories of Papua and New Guinea, 1962.

[11] K. V. Bailey, "Synopsis of rural nutrition studies in Indonesia", *Medical Journal of Australia*, No. 14, May 1964, pp. 669-676; J. D. Wray and A. Aguirre, "Protein-calorie malnutrition in Candelaria, Colombia. I. Prevalence: social and demographic causal factors", *Journal of Tropical Pediatrics*, vol. 15, No. 3 (1969), pp. 76-98; K. V. Rao and C. Gopalan, "Nutrition and family size", *Journal of Nutrition and Dietetics*, vol. 6 (1969), p. 258; N. S. Scrimshaw, C. E. Taylor and J. E. Gordon, *Interactions of Nutrition and Infection*, monograph series No. 57 (Geneva, World Health Organization, 1968).

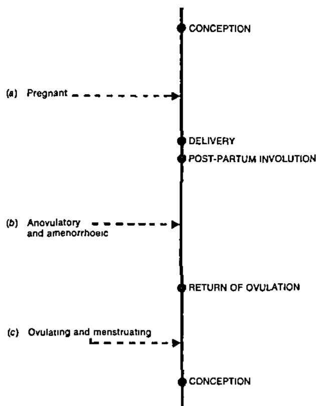
[12] N. S. Scrimshaw and J. E. Gordon, *Malnutrition, Learning and Behaviour* (Cambridge, Massachusetts Institute of Technology Press, 1968); R. E. Klein, "Correlations of mild to moderate protein-calorie malnutrition among rural Guatemalan infants and preschool children", in *Symposia of the Swedish Nutrition Foundation*, vol. XII (Uppsala, Almqvist and Wilsells, 1974); G. Wiener, "Correlates of low birth weight, psychological status at eight to ten years of age", *Pediatric Research*, vol. 2 (1968), pp. 110-118.

[13] F. J. Levinson, *The Effects of Income Change on Food Consumption in South India and Ceylon* (Ithaca, New York, Cornell University Press, 1970); A. Lechtig, and others, *loc. cit.*

[14] P. T. Schultz, *Determinants of Fertility: a Micro Economic Model of Choice* (New York, St. Martin Press for the International Economic Association, 1974); J. D. Wray and A. Aguirre, *loc. cit.*

[15] J. B. Wyon and J. E. Gordon, "A long-term prospective type field study of population dynamics in the Punjab, India" in C. V. Kiser, ed., *Research in Family Planning* (Princeton, New Jersey, Princeton University Press, 1962); R. G. Potter and others, "Fetal wastage in eleven Punjab villages", *Human Biology*, September 1965, pp. 262-273; J. D. Wray, "Population pressure on families: family size and child spacing", in R. Revelle, ed., *Rapid Population Growth: Consequences and Policy Implications* (Baltimore, Johns Hopkins Press, 1971), chap. II; S. M. Wishik and R. G. Stern, "The impact of birth spacing in maternal and child nutrition", *Ecology of Food and Nutrition*, 1974, in press; D. B. Jelliffe and E. F. P. Jelliffe, "An overview. Symposium on the uniqueness of human milk", *American Journal of Clinical Nutrition*, vol. 24, No. 8 (August 1971), pp. 1013-1024.

Figure III. The fertility cycle



usual physiology similar to the effect of disease. Rather, the position is held that a woman adjusts to a new physiology involving herself, the foetus and the placenta These pregnancy-related physiological changes must be reversed after delivery, through a process of readjustment. In general, the readjustment seems to be a fairly prompt response to the restored hormonal balance after delivery. On teleological grounds, this is not surprising, one would expect that reverse adjustment in the healthy post-partum woman would be reasonably complete in time for the next pregnancy Overlap between incomplete restoration and a succeeding pregnancy is, by definition, undesirable. This situation could result from delay of the former and/or failure to respect the "natural" interval between pregnancies.

23. The interval between pregnancies consists of parts (*b*) and (*c*) in figure III, the pregnancy-free period before and after the post-partum return of ovulation. In comparison with the situation that prevailed among earlier societies, these two parts of the "natural" interval are being shortened, first, by replacing the breast-feeding of infants with artificial feeding,[16] thus reducing the effect that lactation has in delaying the return of ovulation [17] Secondly, cultural taboos against post-partum sexual intercourse are being weakened. Both developments are widespread concomitants of the urbanization and industrialization that accompany rapid population growth in less developed countries. The total interval between conceptions is further shortened by abortions and miscarriages and by foetal and early infant deaths, with removal of need for breast-feeding

24. Data are beginning to accumulate on the undesirability of very short interbirth intervals [18] This substantiates the same almost world-wide belief among earlier societies Peoples in parts of Africa and other places have in their languages a word to denote the incompatibility (mutual poisoning) between the baby at the breast and the one growing in the womb.

25 The question is a difficult one to prove. Often, the reported interbirth interval disguises unidentified interrupted pregnancies that produce inverted paradoxical correlations Recent studies have also been more successful than earlier ones in allowing for socio-economic class differences that confer common and parallel effects upon fertility behaviour, nutrition, health and survival [19]

26. The "normal" interbirth interval of earlier societies that would result from a term pregnancy (nine months) plus the anovulation of full breast-feeding (from six to nine months, or more) plus abstinence (another 15 months) equals 2 5 to 3 years To a healthy woman living under favourable conditions, a shorter interval than this may not be threatening. For less healthy women in poverty and under other environmental stresses, what may have otherwise been a physiologically permissible interval becomes "too short".

27 Programme efforts must be directed towards maintaining a safe interval To avoid shortening of component (*a*), gestation, the need is for better nutrition before and during pregnancy and for selective focused ante-partum health supervision and care To prevent shortening of component (*b*), the anovulatory period,

[16] D B Jelliffe and E F. P. Jelliffe, *loc cit*, M. D. Latham, "Conclusions and recommendations on lactation in relation to steroid contraceptives and fertility", draft of posi- ... ttee on Nutrition and ... tional Nutrition Pro- ... s, Washington, D C., ... of breastfeeding and ... *an Journal of Clinical*

Nutrition, vol 26 (1973), pp 556-562, J K. Harfouche "The importance of breastfeeding", *Journal of Tropical Pediatrics*, September 1970, pp. 135-175

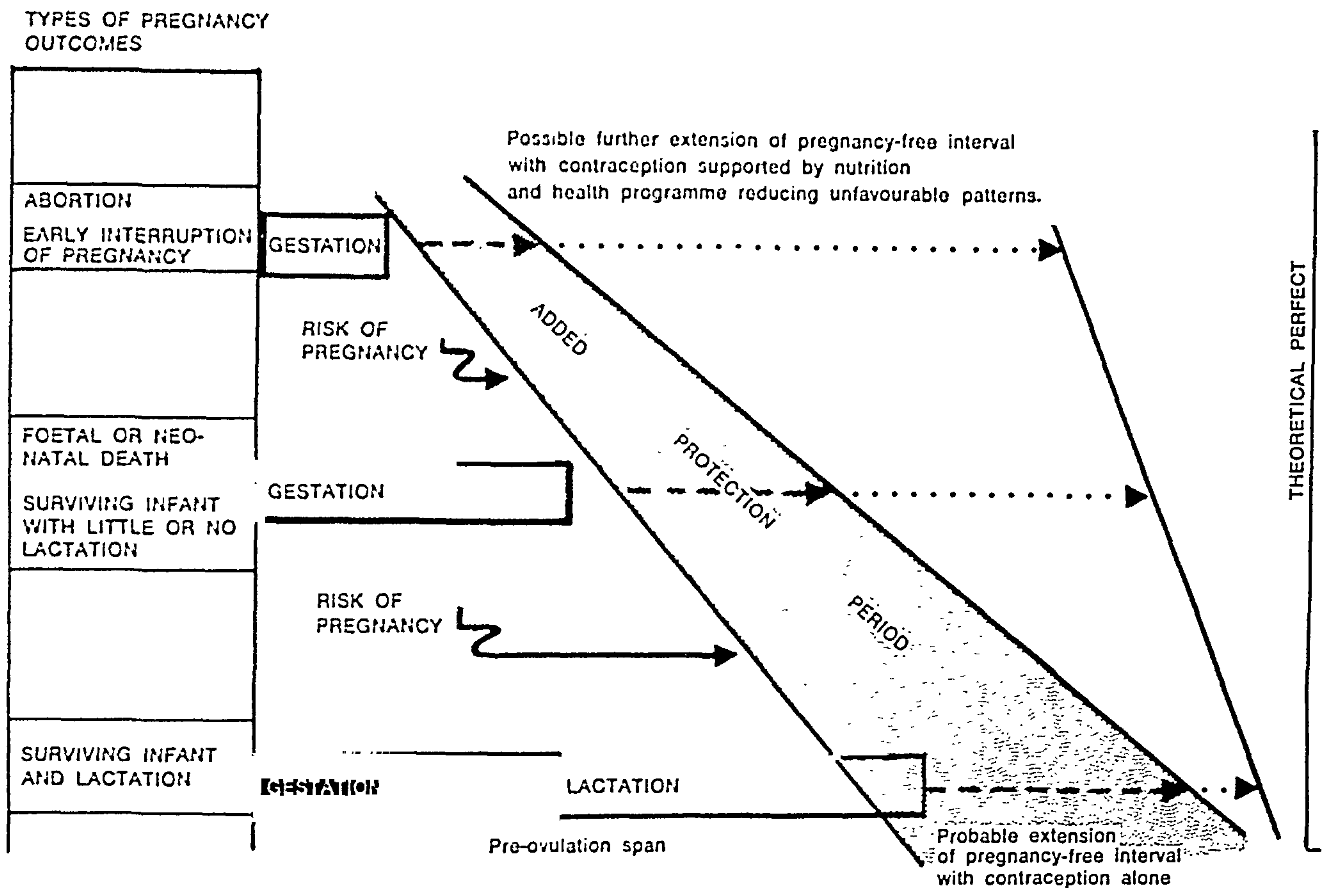
... 1140; E. J Salber, M Feinleib and B MacMahon, "The ...

... and fertility variables in survey data as derived from formulations concerning dependency relationships", paper presented at the annual meeting of the American Public Health Association, San Francisco, California, Novembe 1973.

[19] K V. Bailey, *loc. cit*; ... chtblau ... *cit.*

the need is to assure a surviving infant through its health and nutritional protection, through educational campaigns on the benefits of breast-feeding, designed to counteract commercial pressures towards artificial feeding, and through government policy and programmes that affect the employment roles of women and enhance the opportunities for mothers to remain with and care for their nursing infants. To prevent shortening of component (*c*), the ovulatory period, access to effective contraception is the modern equivalent to post-partum cultural taboos. The associated need is for nutritional protection of nursing mothers and of young children, at least through the post-weaning period (see figure IV).

Figure IV. Theoretical patterns of interbirth intervals



28. Two different sets of hypotheses can be held with respect to the impact upon a given index child of the length of interbirth interval, according to whether the interval under assessment preceded or followed his birth. With a base of the total pregnancy history of his mother, and working backward from his birth, one is concerned with the course of the pregnancy during his intra-uterine residence, his mother's health and environmental stresses during the pregnancy-free interval between his birth and that of his older sibling, the length of that interval, the occurrence of lactation during it and the nature of and sequelae from that earlier pregnancy. Working forward across the interval that followed his birth, on the other hand, one must again include his mother's experience during his embryological and foetal development, his birth and post-partum course, whether he was breast-fed, his subsequent diet and illnesses, and the span of time before his mother conceived again. The pregnancies on both ends of the interval under analysis, as well as the events during that interval, enter into the weighting.

29. Although the mother's full pregnancy and health history is relevant, the authors have arbitrarily chosen to focus on the proximate three-year and five-year periods for intensive quantitative analysis and have developed a number of indexes called "fertility burdens".[20] These constitute bases for classification and statistical comparisons among groupings of women and their children. The indexes, given below, are under continuing validation:

(*a*) Gestation burden; the number of months of pregnancy, weighted by trimesters of pregnancy;

[20] S. M. Wishik, "Fertility burdens", work being done at the International Institute of Human Reproduction, Columbia University, New York, 1974.

(*b*) Lactation burden; the number of months of lactation, weighted by proximity to delivery and extent of supplementation of the infant's diet;

(*c*) Gestation/lactation burden;

(*d*) Child-caring burden; the number of child-years among the siblings during the interval under analysis, weighted by ages of the children;

(*e*) Family food-consumption burden; the number of family members, weighted by age and sex

Work is also in process on improving health and socio-economic indexes suited for such studies

30. Findings indicate that interbirth interval, as measured directly and also as manifested indirectly in women's age-specific parity, correlates significantly with the probability that their young children will achieve better growth and development and nutritional state.[21]

31 Of course, age-specific parity is largely a reflection of spacing Direct measurement of birth interval also reveals very interesting and important health relationships Women whose birth intervals fall at or below two years are not likely to have better nourished children. At higher parity, it takes an interval of almost three years for the children to have a reasonable chance for adequate nutritional state in generally deprived populations [22]

IMPLICATIONS FOR PROGRAMME INTERVENTION

32. The need for a combined approach to achieve the dual objectives of improved nutrition and modified fertility emerges clearly when findings and trends are simulated in different hypothetical communities.[23]

33. The following table presents these cyclical interactive relationships among maternal nutritional status, fertility patterns and behaviour, child health, survival, growth and development, in four types of communities, described below:

(*a*) *Community O* is a deprived population. Mothers are on inadequate diets and their fertility is uncontrolled Since maternal nutrition is poor, mothers will be more vulnerable to unfavourable pregnancy outcomes and interrupted pregnancies. Despite fairly adequate lactation performance, these mothers will still have high infant losses which shorten the interbirth interval Eventually, higher parity will result The combined cyclical interactions adversely affecting pregnancy wastage, maternal nutrition, chances of infant survival, child growth and development and maternal longevity will persist,

(*b*) In *Community A*, diets have been effectively modified Maternal nutritional status should improve and pregnancy outcomes should be more favourable However, if fertility remains uncontrolled, mothers, for parts of their childbearing years, remain in risk categories that enhance pregnancy wastage and infant loss Secondary results would be shorter than desired birth intervals, high over-all parity and possibly reduced maternal longevity Furthermore, among surviving pre-school children, growth and development may be retarded;

(*c*) In *Community B*, effective fertility modification has been introduced If only the fertility factor is "effectively" controlled, maternal nutrition and its sequelae would not be corrected As a result, pregnancy

[21] N Lichtblau, *loc. cit.*

[22] *Ibid*

[23] S. M. Wishik and S. Van der Vynckt, *Uncontrolled Fertility and Malnutrition* (Washington, D C, National Academy of Sciences, 1974)

EXPECTED STATUS IN COMPARISON WITH ACCEPTABLE LEVELS

	Community O deprived population		*Community A effective diet modification*		*Community B effective fertility modification*		*Community AB effective diet and fertility modification*	
Maternal nutrition	Poor		Normal		Poor		Normal	
↓		−		+		−		+
Pregnancy completion chances	Poor		Normal		Increased		Normal	
↓		−		+		−		+
Lactation competence	Adequate		Normal		Adequate		Normal	
↓		+		+		+		+
Infant survival chances	Poor		Increased		Poor		Normal	
↓		−		±		−		+
Birth interval	Short		Shortened		Shortened		Prolonged	
↓		−		±		±		+
Fertility rates	High		High		Reduced		Low	
↓		−		−		+		+
Total pregnancy wastage	High		Reduced		Reduced		Low	
↓		−		±		±		+
Family welfare	Poor		Fair		Poor		Improved	
↓		−		±		−		+
Child growth and development	Poor		Normal or Increased		Poor		Normal	
↓		−		±		−		+
Maternal longevity	Poor		Increased		Poor		Normal	
		−		±		−		+

wastage remains high as in Community O, and leads to *shortened birth intervals and sequelae despite effective* contraception adoption;

(*d*) *Community AB* has an effective combined diet and fertility modification programme. This is the only approach that breaks through these interrelated cyclical phenomena and theoretically permits the attainment of positive results in all the categories listed, as demonstrated by the series of all plus signs in this column.

Conclusion

34. Because of the essential interdependence of fertility modification and nutrition promotion in achieving their common goals of better family health *and welfare, it is recommended that integrated public* programmes be established. Information on the bases for the conjoined attack should be disseminated widely.

35. Intervention programmes should include experimental and control populations in several countries that together represent a reasonable spectrum of levels of development. A common evaluation system with appropriate country adaptations should be built into the project.

36. Allowing for a planning and development period of two years, the prospective span of the project should begin to show results in three years and clearly in five.

GERONTOLOGY AND LONGEVITY

Jerzy Piotrowski *

THE PROSPECTS OF THE AGING PROCESS

1. The aging process which is often coupled with over-all population increase has been observed all over the world Both these phenomena, which intensified in the twentieth century, have their origin closely connected with economic, technical and scientific progress. Improvement in levels of living, especially in nutrition and public health, and the development of medical sciences have made it possible to overcome many illnesses that were previously fatal. These and other favourable changes have led to the decrease of mortality rates, especially in infancy and childhood, but for adults as well More people live to an old age and, after reaching this age, they live longer than before.

2. The increase in the average length of individual life is coupled with the demographic "aging of population". The latter notion is known in demography to denote an increase in the proportion of older people, i e. people who have passed a certain age, among the total population However, the increase of life expectancy due to the decreased probability of death in the young and the old ages is only one of the reasons for the aging of population Another reason is the decline in the birth rate It has generally been observed that the improvement in social, economic and cultural conditions tends to stimulate conscious self-regulation of processes that had been hitherto left to nature, enriches the aspirations and objectives of life, and thus leads to a decrease in the desired number of children in a family A decrease in the absolute or even relative number of children and of young people in the population, in turn, increases the proportion of older generations.

3. The demographic changes mentioned above are found throughout the world, although differing in timing, tempo and magnitude among regions and countries Projections prepared by the Population Division of the United Nations secretariat anticipate the extension of life expectancy and the decrease in crude birth and death rates in all the regions of the world for the period 1970-2000 (table 1) At the same time, these projections show that the population of the world is expected to increase most rapidly in the old ages of 65 and over (table 2).

4 However, the differences between the more and less developed regions are also clearly demonstrated in the projections Crude birth rates in the more developed regions, according to the medium variant of United Nations projections mentioned above, will drop from 17.2 per 1,000 to 15.7 per 1,000, i.e., by 9 per cent, and in the less developed regions from 37.9 per 1,000 to 29.4 per 1,000, i e., by 22 per cent. Crude death rates in the more developed regions are even expected to show a slight increase, due to the increasing propor-

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TABLE 1 CRUDE BIRTH AND DEATH RATES AND LIFE EXPECTANCIES AT BIRTH, 1970-2000, BY REGION

	Crude birth rates		*Crude death rates*		*Life expectancy*	
Region	*1970-1975*	*1995-2000*	*1970-1975*	*1995-2000*	*1970-1975*	*1995-2000*
World total	31.8	26.4	12.7	8.8	58.9	66.1
More developed regions	17.2	15.7	9.2	9.9	71.2	73.5
Less developed regions	37.9	29.4	14.2	8.6	53.9	64.0
Europe	16.1	15.3	10.4	10.5	71.3	74.1
USSR	17.8	16.9	7.8	9.4	70.4	73.0
Northern America	16.5	15.1	9.3	9.8	71.4	72.5
Oceania	25.1	22.2	9.4	8.0	68.3	71.4
Latin America	37.0	29.7	9.2	5.6	61.9	70.6
East Asia	26.0	18.0	9.8	7.7	62.9	71.2
South Asia	42.8	31.3	16.5	8.9	49.5	61.2
Africa	46.5	40.1	19.9	11.3	45.2	57.4

SOURCE United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol I, part two, medium variant; and related unpublished data

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2. The increase in the average length of individual life is coupled with the demographic "aging of population". The latter notion is known in demography to denote an increase in the proportion of older people, i.e. people who have passed a certain age, among the total population. However, the increase of life expectancy due to the decreased probability of death in the young and the old ages is only one of the reasons for the aging of population. Another reason is the decline in the birth rate. It has generally been observed that the improvement in social, economic and cultural conditions tends to stimulate conscious self-regulation of processes that had been hitherto left to nature, enriches the aspirations and objectives of life, and thus leads to a decrease in the desired number of children in a family A decrease in the absolute or even relative number of children and of young people in the population, in turn, increases the proportion of older generations

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Region	*1970-1975*	*1995-2000*	*1970-1975*	*1995-2000*	*1970-1975*	*1995-2000*
World total	31 8	26 4	12.7	8.8	58 9	66 1
More developed regions	17.2	15.7	9.2	9 9	71 2	73 5
Less developed regions	37 9	29.4	14 2	8 6	53 9	64 0
Europe	16.1	15.3	10 4	10 5	71 3	74 1
USSR	17 8	16 9	7 8	9 4	70 4	73.0
Northern America	16 5	15.1	9.3	9.8	71.4	72.5
Oceania	25.1	22 2	9.4	8 0	68 3	71.4
Latin America	37.0	29.7	9.2	5 6	61.9	70 6
East Asia	26 0	18.0	9.8	7.7	62.9	71 2
South Asia	42 8	31.3	16.5	8.9	49 5	61.2
Africa	46 5	40.1	19.9	11.3	45.2	57.4

SOURCE. United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol. I, part two, medium variant; and related unpublished data.

TABLE 2. EXPECTED PERCENTAGE INCREASE OF THE MAIN AGE GROUPS IN THE MORE DEVELOPED AND LESS DEVELOPED REGIONS, 1970-2000

Functional group		*More developed regions*	*Less developed regions*
Pre-school	(0-4) ...	13	65
School age	(5-14) ...	6	85
Younger working age	(15-44) ...	23	112
Elder working age	(45-64) ...	40	111
Old age	(65+) ...	62	138
Total		26	99

SOURCE: United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol. I, part two, medium variant; and related unpublished data.

tion of older people in society, an age group with considerably higher mortality rates than other age groups. On the other hand, the death rate will be reduced rather drastically in the less developed regions—from 14.2 per 1,000 to 8.6 per 1,000, or by 39 per cent. It is to be noted in this regard that the average life expectancy is expected to increase—in the more developed regions by only 3 per cent, from 71.2 to 73.5 years, and in the less developed regions, from 53.9 to 64.0 years or by 19 per cent. During the period, 1970-2000, as a result of changes in crude birth and death rates, the percentage of old-age people (65 and over) among the total population will significantly increase (table 3): in more developed regions, from 9.6 per cent to 12.3 per cent, i.e., by 28 per cent; and in less developed regions, from 3.8 per cent to 4.5 per cent, i.e., by 18 per cent.

5. It is worth observing the aging of males and females separately because of the notable difference in the aging of men and women (table 3). In both the more and the less developed regions, the female population is more advanced in aging than the male population. Since the female life expectancy is generally longer there are more women in the old-age groups, especially in very old age. This causes serious social problems. For example, while the majority of old men remain married, the majority of old women are left single, mostly widowed. This situation brings about particular problems for the old women that are quite considerable and acute in terms of their economic, health and social helplessness.

6. Another correlate of an accelerated aging process is the increasing proportion of the very old among the old population itself. The population projection for Poland, for example, shows that while the number of people aged 60-69 will increase by 40 per cent between 1970-2000, those aged 70-74 will double, and those over 85 will quadruple.

7. In the foregoing discussion, use has been made of the results of population projections into the future. These have been based on knowledge obtained through scientific observation of the past with due consideration of the factors determining the aging process, especially

TABLE 3. AGE DISTRIBUTION POPULATION, BY REGIONS OF THE WORLD, 1970, 1985 AND 2000

(Percentage)

	More developed regions			*Less developed regions*		
Age group	*1970*	*1985*	*2000*	*1970*	*1985*	*2000*
			Both sexes			
0-14	26.7	23.9	22.8	40.5	39.6	36.3
15-24	16.6	15.5	14.9	18.9	19.1	19.3
25-44	26.9	28.4	27.8	24.1	24.6	26.4
45-64	20.0	21.5	22.2	12.7	12.6	13.5
65+	9.6	10.8	12.3	3.8	4.0	4.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
			Males			
0-24	45.8	41.3	39.1	59.5	58.9	56.0
25-44	27.7	29.4	28.6	24.3	24.7	26.5
45-64	18.7	20.9	22.1	12.7	12.6	13.3
65+	7.8	8.5	10.2	3.5	3.8	4.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
			Females			
0-24	41.2	37.6	36.3	59.3	58.5	55.3
25-44	26.2	27.4	27.0	24.0	24.6	26.3
45-64	21.3	22.0	22.3	12.7	12.7	13.6
65+	11.3	13.0	14.4	4.0	4.3	4.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

SOURCE: United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol. I, part two, medium variant; and related unpublished data.

of the evolution of the birth and death rates, which are presumably influenced by economic and cultural conditions, the power of tradition, the urban or rural social environment and so on. Regardless of the difficulties involved in the assessment of future courses of vital rates, however, one may rather expect a continuity of downward trends in birth rates in most regions of the world, as assumed in the United Nations projections mentioned above. The pace of decline may vary, depending in part upon the level of achievement in birth control programmes in various regions and among various strata of society. The experience of western and northern European countries appears to indicate a decline in birth rate from a certain high level to a relatively low level at which it stays as if stabilized Experience in these countries proves the failure of means and measures directed towards increasing natality. For the less developed regions, one may rather assume an accelerated diffusion of birth control practices Both educational campaigns and the provision of adequate contraceptives are realizable. With the progress of economic development and improvements in the level of living, a tendency to limit the number of children in the family becomes more common.

8. Prognoses elaborated in different parts of the world are generally optimistic in forecasting further medical successes in the war against death One may thus assume that certain illnesses, such as tumours, cardiac and respiratory diseases, which mostly affect the old people, will be combated or alleviated. One may also expect a further improvement in the general health protection and the prevention of certain diseases that may reduce, to a great extent, the organic defects of old people. Environmental changes might allow for longer and healthier lives even in very old age, although, on the other hand, they may increase the risk of death.[1] In any case, it appears that a further drop in mortality or a further shift of deaths to later and later ages can be expected.

9 In a fairly long-term perspective, one should, therefore, take into account the progress of the aging of population in all regions of the world, as expressed in terms of a proportion of the old-age group to the whole population ("index of aging"). Simultaneously, a corresponding increase in the number of persons in the old-age group *per capita* of the working age will be observed The latter indicator of the numerical relation between the number of working and non-working old people reflects the economic problems of aging better than the index of aging mentioned above. The second indicator can be called the "index of charge" Table 4 presents both indexes for several areas of the world for the period 1970-2000, which were derived from the data of the already cited "World and regional population prospects" Due to the grouping of available data, that is, 15-24, 25-44 and 45-64, the working age has been set at 25-64 Though a lower age limit of 25 is evidently too high, it seems better than 15 in the context discussed above.

10 The index of charge, like the index of aging, is highly differentiated among the areas and the two have a high correlation Areas with higher indexes of aging have higher indexes of charge, a pattern which seems to stand to reason. In Africa, the aging index is 3.0 per cent and the index of charge is 8 7 per cent, while in Europe the aging index is 11 4 per cent and the index of charge is 23 7 per cent The indexes of charge will increase in the coming decades as they have

[1] D H Meadows, and others, *The Limits to Growth. A Report for the Club of Rome's Project on the Predicament of Mankind* (New York, Universe Books, 1972) warns against the possibility of an increase in the death rate due to the exhaustion of natural food and industrial resources This could have different effects on the aging of societies if the results of such crises affected children, or old people, or the society as a whole

TABLE 4 PERCENTAGE AGE DISTRIBUTION OF THE POPULATION OF SELECTED REGIONS, 1970-2000

Age groups	Europe	North America	Oceania	East Asia	Latin America	South Asia	Africa
			1970				
0-24	40	46	50	53	62	61	63
25-44	27	24	25	26	23	24	24
45-64	22	20	18	16	12	12	11
65+	11.4	9.7	7.3	5 4	3 7	3 1	3
			2000				
0-24	36	38	47	42	57	59	63
25-44	28	29	27	30	26	26	23
45-64	23	22	18	20	13	12	11
65+	13.5	10 8	7 8	7 9	4 5	3.7	3
Total	100	100	100	100	100	100	100

SOURCE United Nations Secretariat, Population Division, "World and regional population prospects", *Population Debate*, vol I, part two, medium variant, and related unpublished data.

method, however, can be used in rich countries with high labour productivity, where the actual surplus of the labour force is not excessive.

22. Similar principles apply to self-employed peasants, working on traditional family farms, who at a certain time, determined more or less by custom, transfer their farms to their children and take a "well-deserved rest". This is justified by the decline in their working capacities, but also by the right to rest. The choice of the moment is, to a certain extent, influenced by the situation on the labour market. If, for example, there are difficulties in finding employment outside agriculture, if the young people cannot find jobs in towns, as is common in under-developed countries where the agricultural sector prevails in the economy, then pressure is exerted on the aging father, on overcrowded farms, to force him to transfer his farm, or its management, to his children, even though he is in the prime of life.

23. A surplus of labour, for existing employment possibilities, creates, as a rule, pressures to remove old employees. This is particularly the case in periods of intensified unemployment or underemployment (on farms). Pressures also arise because of technological progress, i.e., they arise in dynamically developing economies. For example, in the automotive industry in the United States of America, due to the automation of production, the required number of workers fell; the retirement age by virtue of agreements between trade unions and management was lowered to 60 or even 55 years, with retirement pensions after that age, covered by employers. Due to the large increase in productivity, the companies could meet this new burden at no loss, and even acquire additional profits. This method permitted the retirement of older workers instead of the young ones without any formal infringement of seniority principle. In this way, fit and capable people moved into retirement, not because of unfavourable changes in their gifts and capacities, but due to the decrease of their relative technical or economical suitability to their work. It could be considered a picture on a micro-social scale of the macro-social phenomena to be expected in the rapidly developing regions of the world.

24. The age of retirement becomes, to an always lesser degree, identified with loss of working capacity. Some people lose their fitness and capacity to work before the age of retirement, while others maintain these qualities long past this stage. This is a highly individual phenomenon, as people, on the one hand, differ greatly in their physical and mental fitness, gifts and abilities; and, on the other, in their jobs, professions, posts and responsibilities. The blue-collar worker, whose work requires physical skills, experiences difficulties earlier than the white-collar worker, whose job is more connected with brains. The same applies to people with high and low educational levels. Various studies indicate that both older blue- and white-collar workers are faced, although not to the same extent, with environmental problems in their work. For these reasons, the tendency to lower the pensionable age becomes increasingly popular.

25. It appears that ever-increasing progress, envisaged in various fields of technology and economy, will act in the same direction. New jobs will require higher skills and will become more expensive, but relatively fewer working positions will be needed, as in the future fewer people will be producing more goods. When, due to the better equipment required for particular working positions, the social product obtained will be larger, some part of labour resources will become redundant.

26. This in turn permits a reduction of "labour time" and an extension of "leisure time". Extended leisure time can be used for longer training and education, longer holidays and for earlier retirement. This can be seen already in the developed countries in the form of a concealed unemployment of older workers, or in the tendency to make the retirement age more elastic. There has been a growth of masses of people, who, from the bio-psychological point of view, have not yet become old, but who are old in the social meaning of this concept, as being in the post-productive age.

27. In the developing countries, similar phenomena may take place among the population working in the industrial sector of the economy, as a result of labour force surplus and the development of professional education for young people pushing older ones out of their jobs. Among the rural population, working in traditional types of agriculture, this problem is of a different character, i.e., underemployment is dispersed among all groups of productive age. The modernization of agriculture will lead to the ouster of the older farmers from productive activity.

28. This situation is experienced by many people who have retired, having passed the fixed retirement age but who feel fit and are able to work. Investigations in many countries indicate that people of 65 and over are mostly fit and able to live independently, and quite a number of them keep in a good shape for a long time. Even in the group aged 80 and over, about 50 per cent of the people under study are physically and mentally fit enough to live on their own. In the age group 65-75, the proportion amounts to 70-80 per cent.

29. More people in the world are reaching the age of 60 or 65, and having reached this age live longer than was the case before. Already, in some countries, the average life expectancy for people aged 65 years is 14 years for men (Mexico, Sweden), and over 16 years for women (France, the Netherlands, Sweden). The control of old-age diseases and of deaths caused by them—which is theoretically possible and forecast for before the end of this century—will increase the chances of reaching old age in an ever better state of health. Summing up the results of research on the influence of diseases on the aging process, it is apparent that if individuals retain their health with advancing age, they are remarkably young. With the promise of medical

advances in the control of the now common metabolic diseases of later life, more people will be seen who are old in years, but functionally young by current standards.

30. Thus, there are real chances that in the long-term perspective, the old or rather post-productive age, will begin earlier and last longer With more than 20 years average life expectancy at the age of 60, more people will live to be 90-100 years old. An ever-increasing number of people will be encompassed by the post-productive period of 30-40 years, that is, not much shorter than the working-age period.

31. Summing up, it may be envisaged that:

(*a*) Post-productive age will be extended into several dozens of years, because of the later age of death;

(*b*) Post-productive age will commence earlier, mainly due to the lowering of retirement age, as an ever more common type of shortening the labour time;

(*c*) The population covered by this extended period will become more differentiated in age, health and other features, as well as in its occupational status, living conditions, aspirations and requirements, and it will include people who are fit, efficient, active and with vivid interest in life, self-sufficient and independent, with regard to whom the term "old" will no longer be relevant, as it is not relevant now to a number of people who are considered to be old according to the chronological demographic terminology. It will also encompass people in bad health, weak and senile, requiring permanent care and assistance in their everyday problems, and these people will depend heavily upon others; and it is with such people that the notion of old age is commonly associated.

32. In order to define the first group, the fit and healthy people, another term is needed. It might well be "post-productive age", or the French term, the "third age", or "elderly", which are more suitable as being more neutral. Perhaps one should use the concept of "elderly people" to define all the people in the later part of life, "retired" to define those who passed the threshold of retirement age irrespective of the state of their capacity, and "old" for the senile and feeble Problems of terminology and concepts require further discussion and definition, whereas this paper is concerned with a problem for which a solution should be found.

33. It is worth while making a conceptual division between the above-mentioned notions, especially of "the elderly" and "the old", as each encompasses different categories of people and different social problems. Particularly, such a division should prevent confusion of these concepts, since old age understood as a decline of one's strength in late age is something other than giving up work because of age, or because of other factors as, e g, completion of the full-term service, technical innovations etc. It can be assumed that in a fairly long-term perspective the group of fit people in the "post-productive age" will increase in number in all the regions of the world. As far as the second group is concerned, the "old", one cannot be absolutely sure about the prognosis. This group can increase due to the faster increase of the oldest people, marked on the average by weaker health, but it can also remain at the same level, or even be reduced, due to the expansion of welfare and advances in medicine to control diseases, which until now remain the main reasons of senility.

Social problems of old age

34. Problems connected with the aging of individuals and societies are very serious and distinct Social security, in the broad meaning of this notion, for the growing masses of old people requires far-reaching changes in the distribution of social income. The following areas can be indicated as the areas of needs of old people.

35 In the field of health, needs and requirements are connected with maintaining and recovering health, i e, the whole range of early preventive measures, provision of systematic health services for maintaining good health, curing and rehabilitative purposes.

36. Work is the need felt by a minority of elderly people, as the results of the several researches indicate. The differences in attitude towards work depend mainly upon the different levels of education, professional status and financial position Thus, the postulate of a greater elasticity in determining the retirement age is put forward, according to the desire and capacity to work, in conformity with the human right to work

37. Some desire their own means of subsistence. Old people, as a rule, sooner or later give up work as the main source of subsistence, and they have to secure means from other sources. Means of subsistence of their own are important not only from the financial point of view, but from the social as well. They allow feelings of individual autonomy and dignity to be maintained. It is not only important for hired labour, but for the self-employed and for farmers deriving their means from the family farm already transferred to the children. The cost of old-age security not only increases with the number of elderly people, but is coupled with increases in living costs, living standards and needs.

38. Many old people share accommodation with their children either because of tradition or housing shortages. The desire to have a place of one's own but close to the children is becoming widespread. This is the chief concern of old people in matters of accommodation. A second concern is that of poorly equipped housing, resulting in constraints on the life possibilities of elderly people. Houses and flats that are properly adapted can easily overcome this problem and broaden the life capacities of old people.

39. In the field of social services and benefits, studies in more developed countries have shown t

many old people are unable to cope independently or without difficulty with some basic activities of everyday life, such as making meals, shopping, taking a bath or going for a walk. They also require assistance during sickness, bad weather and even temporary financial problems. Thus, there is a need for social services that would compensate for such short-comings and meet their needs.

40. Attitudes towards the elderly cause concern. The elderly are faced with many problems because of the negative or depreciating attitudes and stereotypes towards them. An educational campaign is required to overcome these patterns of behaviour, *inter alia*, against treating the old people like one mass of passive subjects deprived of individual features.

41. There are two basic social institutions participating in meeting the needs of old people, namely, public bureaucratic organizations like the State, the community etc., and the family. In the period prior to industrialization, the main, and often total, responsibility rests within the family where the elderly live. Along with the spread of hired labour, social security and social welfare, these institutions take over some of the responsibilities of the family, especially in the financial or material sphere. Yet, the family still plays a big role, particularly the children of the old people, in maintaining live contacts between generations, rendering various services and assistance. Empirical research does not confirm popular opinions about the fade-out of many family functions. It is true that with regard to care and welfare functions, social institutions are of considerable importance, but they did not limit the scope of family functions, which have now been transformed. Allowing for a considerable degree of simplification, it may be said that the need for new services, such as old-age pensions, provided by the State made itself felt because of changed working conditions, e.g., in the change from family farming to hired labour, the family is less able to provide economically for the elderly.

42. To summarize, it may be said that public bureaucratic institutions take over, to an ever-increasing extent, the satisfaction of needs requiring special qualifications as well as typical needs, while the family maintains the responsibility for more individual idiosyncratic assistance. For most older people, and to a high degree, for most of their children, the middle generation, the family continues to be the most important social environment and the source of mutual emotional security and satisfaction. Therefore, both the family and bureaucracy have to co-operate in creating optimum living conditions for the elderly. Future development trends seem to be in this direction.

43. Many problems connected with the aging of individuals and societies require deeper and more thorough studies. In this paper, the general outline of the problem has been presented, which takes different dimensions depending upon the regions of the world and upon economic, social and cultural conditions. The proper policy towards old age must be based upon good knowledge of the facts of the living conditions and needs of the elderly, and the means at their disposal, of the trends in family behaviour and transformations in the social structure. Gerontology, and social gerontology in particular, are trying to explore all the problems of aging and older age. The problems of aging are problems of all the regions of the world. The developing countries as well will be faced, in the not too remote future, with the problems of aging, due to the envisaged declines in birth and death rates, and because of their social and economic progress.

44. The extension of life into the post-productive or third age becomes increasingly common. The problem does not boil down to the question of what has to be done for the elderly, but how to plan and organize for these years. Concern must be about the transfer of means and resources into the later years, the redistribution of wealth and other resources that is indispensable if the elderly are to take advantage of the rights incorporated in the Universal Declaration of Human Rights and in the Declaration of Social Development and Social Progress. There is, perhaps, a need for a Charter of the Rights of the Elderly based on these two basic United Nations documents.

POPULATION ET DÉVELOPPEMENT EN AFRIQUE *

Commission économique pour l'Afrique

1. Si l'on admet que le but de toute action de développement est, avant tout, l'amélioration de la qualité de la vie humaine, l'on conviendra alors, de l'importance que revêt le facteur démographique dans le processus du développement économique et social en Afrique.

2 Dans une première étude, la Commission économique pour l'Afrique avait, à l'intention des pays membres de la Commission, déjà procédé à une analyse de l'impact de l'accroissement démographique sur les perspectives économiques et sociales du continent, au cours des prochaines décennies, en l'absence d'une politique cohérente en matière de planification qui tiendrait davantage compte du facteur population.

3. Il ressort de ces travaux, que dans les conditions actuelles d'une croissance démographique se situant autour de 2,5 ou même de 3 p. 100 pour l'ensemble du continent, le taux d'investissement minimum requis pour simplement garantir à l'Homme africain son niveau de vie actuel au cours des 30 prochaines années qui nous séparent encore de la fin du siècle, serait de 8 p. 100 par an.

4. Certes de telles perspectives, exprimées en termes aussi généraux, ne pouvaient produire l'effet nécessaire, permettant au niveau de chaque pays de la région, une prise de conscience réelle de la nature ainsi que de l'importance des problèmes que pose une croissance accélérée de la population dans un pays en voie de développement.

5. C'est par conséquent, dans le but de parvenir à une meilleure sensibilisation de l'opinion africaine tant au niveau des responsables chargés des politiques gouvernementales qu'en ce qui concerne les milieux de chercheurs et spécialistes africains confrontés avec diverses tâches de planification du développement, que la Commission économique pour l'Afrique entreprend depuis bientôt deux ans, une nouvelle série de recherches portant sur des études de cas par pays et devant couvrir l'ensemble de la région au cours des prochaines années. Ces études traitent ainsi d'une manière plus concrète et plus approfondie de situations particulières résultant de l'impact du facteur démographique sur les principaux indicateurs de la croissance économique et du progrès.

6. Un tel programme vise avant tout à doter les systèmes de planification des pays de la région, d'un instrument d'analyse qui permettrait non seulement d'étudier plus en détail le mécanisme global de la croissance elle-même, mais encore, de déceler d'une manière plus précise, les interactions des principaux facteurs qui interviennent dans ce mécanisme et dont les effets pour la plupart, ne sont pas toujours facilement perceptibles

7. Certes dans le passé, en raison sans doute de l'extrême complexité des variables qui sont en jeu, et compte tenu de l'état des statistiques disponibles, l'impact de la croissance démographique avait du être négligé lors de la mise en œuvre de nombreux plans africains, lorsqu'il n'était pas tout simplement traité en termes généraux et selon des méthodes parfois contradictoires D'où l'impossibilité pour les responsables des décisions en matière de politique et d'orientation économique, de se faire à l'époque, une idée exacte de l'importance du facteur population dans le contexte général du développement des pays de la région

8 Il est toutefois certain que la lenteur du progrès accompli aussi bien sur le plan économique que sur le plan social dans nombre de pays de la région au cours des récentes décennies, pour ne pas dire l'échec de nombreux plans en ce qui concerne l'accomplissement des objectifs sociaux fondamentaux qu'ils s'étaient assignés au lendemain des indépendances, incite aujourd'hui, plus que jamais, à la recherche d'un nouveau concept du développement [1] qui tiendrait davantage compte et d'une manière plus systématique qu'auparavant, du facteur population qui, jusqu'ici, a été laissé pour compte dans les mécanismes essentiels de la planification, tels qu'ils ont été imaginés jusqu'à une époque récente par de nombreux experts en Afrique.

9. La présente communication expose donc un certain nombre de conclusions auxquelles sont parvenus les auteurs qui ont participé à la première phase du programme d'études de cas de la commission économique pour l'Afrique [2], phase qui a porté sur 16 travaux dont 10 au niveau "macro" et 6 au niveau "micro", et qui ont été présentés à la Conférence

* L'original de ce document (E/CONF.60/SYM I/25) a été rédigé pour le Colloque sur les relations entre la population et le développement, Le Caire, 4-14 juin 1973.

[1] Voir "Stratégie de l'Afrique pour le développement durant les années 70" [voir *Documents officiels du Conseil économique et social, cinquante et unième session, Supplément n° 5* (E/4997), vol. I, par 342].

[2] Pour la liste de ces études de cas, voir annexe.

africaine sur la population ainsi qu'à la première session de la Conférence des démographes africains, toutes deux tenues à Accra, au mois de décembre 1971.

10. Parmi les principaux indicateurs à partir desquels les différents auteurs ont tenté d'appréhender certaines conséquences directes et indirectes d'une modification significative du comportement de la population sur le schéma général de la croissance et du développement en Afrique, au cours des années à venir, ceux qui ont été surtout considérés comme particulièrement déterminants sont: le produit intérieur brut, le revenu moyen par habitant, les niveaux de l'épargne intérieure et des investissements, les charges récurrentes pour le budget de l'Etat, engendrées par le niveau général de la "demande sociale" résultant de la situation démographique, telles que les dépenses en matière d'éducation, de formation, de santé et d'hygiène ainsi que le niveau de la demande alimentaire dans les villes et dans les zones rurales.

Les économies africaines des années 70 et perspectives d'avenir: situation démographique

11. La tendance démographique actuelle qui se caractérise par un accroissement rapide de la population est, sans conteste, un phénomène relativement récent en Afrique.

Fécondité et mortalité

12. Les deux traits essentiels de la situation démographique en Afrique, comme cela a été d'ailleurs observé dans d'autres régions insuffisamment développées du monde, sont d'une part, un abaissement régulier, depuis une vingtaine d'années environ, du taux de mortalité, face d'autre part, à un niveau relativement stable de la fécondité, avec pour conséquence, un taux de croissance naturelle de la population qui, en moyenne, approche à présent les 3 p. 100 par an dans la plupart des pays de la région.

13. L'analyse de cette tendance a déjà fait l'objet de nombreuses études, de réunions de groupes de travail et de séminaires, dont les plus marquants ont été le Cycle d'études sur les problèmes de population en Afrique, tenu au Caire du 29 octobre au 10 novembre 1962, les différentes sessions de la Conférence des statisticiens africains, les groupes de travail sur les études de fécondité.

14. Par ailleurs, en dehors des publications statistiques courantes que fournissent la Commission économique pour l'Afrique et les services statistiques nationaux, il existe de nombreux ouvrages traitant de ce sujet.

15. Cependant, une évaluation sommaire des différents plans africains, montre que les rapports entre cette tendance proprement dite et le progrès économique et social accompli par ailleurs, n'ont pas eu dans le passé, toute l'attention qu'ils méritaient.

16. Le tableau 1 (voir p. 623) donne les taux bruts estimés de natalité et de mortalité pour les grandes sous-régions du continent et pour quelques pays particuliers. Ces chiffres indiquent un net fléchissement de la mortalité dans l'ensemble de la région au cours de 20 années, soit 28,3 en 1950 contre 24,3 en 1970 tandis que la natalité n'a, quant à elle, pratiquement pas varié: 48.8. Le résultat de cette situation a été que le taux de croissance démographique du continent est passé de 2,05 à 2,45 en l'espace de vingt ans et l'espérance de vie à la naissance de 32,3 à 39,2. Ces diverses tendances sont résumées par le tableau 2 suivant:

TABLEAU 2. TENDANCES DÉMOGRAPHIQUES EN AFRIQUE, 1950-1970

Paramètres	*1950-1955*	*1955-1960*	*1960-1965*	*1965-1970*
Natalité	48,8	48,8	49,0	48,8
Mortalité	28,3	26,8	25,2	24,3
Accroissement	2,05	2,20	2,38	2,45
Espérance de vie à la naissance	32,3	34,5	36,8	39,2

17. Chose extrêmement importante, ces chiffres montrent que même si les taux de mortalité ont baissé, ils demeurent en général très élevés, ce qui à cet égard, laisse place à une très nette amélioration de la situation démographique générale du continent au cours des prochaines décades.

18. Certes les causes d'une telle situation sont bien connues. En effet, la baisse de la mortalité, tout spécialement en Afrique tropicale est le résultat de deux actions combinées: d'une part la médecine préventive, grâce aux programmes de luttes contre les grandes endémies entreprises à grande échelle depuis plusieurs années, tend à l'élimination progressive dans le continent, de certaines épidémies et maladies contagieuses comme la méningite, la variole, la fièvre jaune, la maladie du sommeil et la tuberculose qui ont causé autrefois de véritables ravages au sein des populations africaines. D'autre part, l'on note une certaine amélioration des conditions sanitaires en général et de l'hygiène individuelle en particulier, cela grâce à l'éducation des populations par recours aux moyens de communication de masse comme la radio, la télévision éducative, grâce au développement des centres sociaux et éducatifs qui ont permis, dans une large mesure, la diffusion des méthodes prophylactiques sommaires, ainsi que les pratiques de certaines règles élémentaires en matière d'hygiène personnelle qui sont à la portée aussi bien des populations des villes que de celles des campagnes.

19. Des études récentes qui ont porté notamment sur les effets de l'éducation sanitaire sur la mortalité infantile (enfants de 1 à 4 ans) dans une agglomération rurale du Sénégal, ont ainsi mis en évidence les effets que les cours d'hygiène élémentaire dispensés aux parents, peuvent avoir sur les taux bruts de mortalité infantile lorsque l'on se trouve en l'absence de facteurs écologiques et autres.

20. Certains facteurs responsables de la persistance des niveaux élevés de fécondité sont exposés dans les

TABLEAU 1 TAUX BRUTS ESTIMATIFS DE NATALITÉ, DE MORTALITÉ, TAUX D'ACCROISSEMENT NATUREL ET ESPÉRANCE DE VIE À LA NAISSANCE POUR LES SOUS-RÉGIONS ET CERTAINS PAYS D'AFRIQUE, 1950-1955 À 1965-1970

Sous-régions et pays	Taux bruts de natalité				Taux bruts de mortalité				Taux d'accroissement naturel				Espérance de vie à la naissance			
	1950-1955	1955-1960	1960-1965	1965-1970	1950-1955	1955-1960	1960-1965	1965-1970	1950-1955	1955-1960	1960-1965	1965-1970	1950-1955	1955-1960	1960-1965	1965-1970
Afrique du Nord	48,0	47,5	47,5	46,9	23,7	21,2	19,1	16,9	2,43	2,63	2,84	3,00	42,3	44,8	47,3	49,8
Algérie	51,0	50,8	50,4	49,1	23,9	21,2	19,4	16,9	2,71	2,96	3,10	3,22	43,1	45,6	48,1	50,7
Soudan	50,0	51,4	49,3	48,9	26,3	23,0	21,3	18,4	2,37	2,84	2,80	3,05	40,1	42,6	45,1	47,6
Tunisie	46,4	46,7	46,5	46,3	22,7	20,3	17,9	16,0	2,37	2,64	2,86	3,03	43,6	46,1	48,6	51,7
Egypte	44,9	43,2	44,5	44,1	21,6	19,9	18,0	16,5	2,33	2,33	2,65	2,76	42,4	44,9	47,4	49,9
Afrique de l'Ouest	48,8	48,8	49,0	48,8	28,3	26,8	25,2	24,3	2,05	2,20	2,38	2,45	32,3	34,5	36,8	39,2
Ghana	49,6	49,2	47,5	46,6	23,0	22,0	19,9	17,8	2,66	2,72	2,76	2,88	38,4	40,9	43,4	46,0
Mali	50,1	50,1	49,4	49,8	33,1	31,7	29,0	26,6	1,70	1,84	2,04	2,32	33,5	34,7	36,0	37,2
Nigéria	49,1	49,4	50,0	49,6	27,5	26,2	25,0	24,9	2,16	2,32	2,50	2,47	31,3	33,4	35,9	38,5
Sénégal	47,1	46,3	46,5	46,3	29,4	27,4	25,8	22,8	1,77	1,89	2,07	2,35	33,4	35,9	38,4	41,0
Afrique du Centre	45,5	45,2	45,0	45,3	29,3	27,6	26,1	24,3	1,62	1,76	1,89	2,10	34,5	35,7	36,9	39,3
République-Unie du Cameroun	43,7	43,2	42,7	43,1	28,8	27,1	25,0	22,8	1,49	1,61	1,77	2,03	33,4	35,9	38,4	41,0
Zaïre	44,4	44,5	44,5	44,4	28,0	25,9	24,5	22,7	1,64	1,86	2,00	2,172	38,3	38,4	38,4	41,0
Afrique de l'Est	47,2	46,8	46,4	46,6	26,8	25,3	23,6	21,8	2,04	2,15	2,28	2,48	35,0	37,5	40,0	42,3
Ethiopie	45,7	45,6	45,0	45,6	30,5	29,2	27,5	25,0	1,52	1,64	1,75	2,06	31,3	33,4	35,9	38,5
Kenya	48,6	47,7	47,0	47,8	18,3	18,2	18,3	17,5	3,03	2,95	2,87	3,03	40,0	42,5	44,9	47,5
République-Unie de Tanzanie	47,6	47,0	48,1	47,2	26,1	25,1	23,7	22,1	2,15	2,19	2,44	2,51	34,2	36,7	39,2	41,8

SOURCE — "Estimates of crude birth rates, crude death rates, and expectation of life at birth, regions and countries 1950-1965 (ESA/P/WP/38)"

démographique pourrait s'élargir encore davantage dans nombre de pays.

26. Les problèmes qu'impliquent une telle tendance ne sont pas évidemment sans conséquences décisives sur la physionomie générale aussi bien économique que sociale du continent, dans les prochaines décennies, puisqu'ils touchent à la fois des domaines aussi vitaux que l'éducation, la formation, l'emploi, et les ressources alimentaires disponibles dans un pays, même si le caractère de gravité que ces mêmes problèmes peuvent revêtir, varie suivant que l'on a affaire à des sociétés traditionnelles reposant largement sur une économie de subsistance, ou à des sociétés de type moderne, essentiellement régies par les économies d'échanges et dans lesquelles, par conséquent, le niveau de la "demande sociale" revêt une importance capitale En effet, dans une société traditionnelle, il est relativement peu onéreux d'élever des enfants (l'instruction conventionnelle n'étant pas requise, par exemple) et les enfants peuvent commencer tôt à exercer une activité économique. Dans une société plus moderne, l'éducation, l'amélioration de l'hygiène et d'autres coûteux efforts d'ordre social prennent une importance primordiale. Dans ces conditions, l'enfant demeurera plus longtemps à charge (c'est-à-dire non productif), ce qui suppose une augmentation des dépenses sociales qui devront être dans la plupart des cas supportées presque exclusivement par l'Etat.

Répartition géographique

27. Un autre fait indéniable est que la population africaine subit à présent de profondes mutations. Celles-ci s'opèrent lentement certes, mais de manière suffisamment perceptible. En effet, même si une très forte proportion de gens réside encore dans les zones rurales, le phénomène d'urbanisation est en passe de devenir en Afrique, une réalité à l'échelle du continent tout entier et les grandes métropoles africaines connaissent, à leur tour, les mêmes maux que ceux auxquels sont confrontées, depuis bien plus longtemps, les deux autres régions sous-développées du monde. En particulier, l'exode rural, à forte prédominance de jeunes ruraux, constitue un phénomène extrêmement important par lui-même, en raison de son impact direct sur l'économie des régions concernées, notamment perturbation du marché du travail, risque de fléchissement de la productivité marginale de certaines catégories de travailleurs sans qualification utilisés dans le secteur moderne, créations de "bidonvilles" à fort coefficient d'insalubrité dans la périphérie des grandes métropoles.

28. Le tableau 4 donne la répartition, entre zones rurales et urbaines, de la population de certains pays africains Comme on peut le constater, une très forte proportion de la population de la majorité des pays africains réside encore dans les zones rurales. Parmi les pays considérés dans les études de cas, l'Egypte est le seul où près de 40 p 100 de la population vit dans les villes. Dans plusieurs autres pays (République-Unie de Tanzanie, Soudan, Ethiopie), le pourcentage de la population urbaine est encore, selon certaines estimations récentes, égal ou inférieur à 10. Bien que la définition du secteur urbain varie notablement à l'intérieur de l'Afrique comme dans le reste du monde, on peut probablement affirmer sans risque de se tromper que la répartition de la population dans la majorité des pays africains se caractérisera pendant plusieurs années encore par la prépondérance de l'élément rural En fait, dans certains pays, une proportion notable des citadins compte encore essentiellement sur l'agriculture comme moyen d'existence.

TABLEAU 4 POURCENTAGE DE LA POPULATION TOTALE RÉSIDANT DANS LES VILLES DE 20 000 HABITANTS ET PLUS POUR CERTAINS PAYS AFRICAINS

Sous-régions et pays	*Années*	*Pourcentage de la population totale résidant dans les villes de 20 000 habitants et plus*
Afrique du Nord	1960	24
Algérie	1966	26,5
Egypte	1966	38,2
Soudan	1962	3,9
Tunisie	1966	22,9
Afrique de l'Ouest	1960	12
Ghana	1960	12,3
Mali	1962	4,7
Nigéria	1963	14,0
Sénégal	1960/61	22,5
Afrique du Centre	1960	8
République-Unie du Cameroun	1962/64	6,6
Zaïre	1959	9,1
Afrique de l'Est	1960	5,7
Ethiopie	1965	4,7
Kenya	1962	5,9
République-Unie de Tanzanie	1967	5,1

SOURCE. — CEA, *Guide démographique de l'Afrique, 1968*, p 39 à 42.

29. Cependant, les migrations de population rurale vers les agglomérations urbaines ont été importantes en Afrique, particulièrement au cours des dernières années. Les taux d'accroissement de la population urbaine, en particulier ceux des grandes villes, ont été en moyenne au moins trois fois plus élevés que le taux global d'accroissement de la population [7]. Il est difficile d'expliquer ce mouvement de population par des raisons précises; la question se pose de savoir s'il tient surtout à des facteurs de répulsion liés aux mauvaises

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[illegible] pour la population urbaine, des taux d'accroissement [illegible] supérieurs à 10 p 100 dans les dernières années [illegible] premières années 60. Voir à ce sujet le *Guide démographique de l'Afrique, 1968*, Commission économique pour l'Afrique, Addis-Abeba, tableau 12.

conditions qui règnent dans les zones rurales ou à des facteurs d'attraction liés aux possibilités d'emploi et aux avantages qu'offre la vie urbaine. L'une des considérations primordiales en la matière, comme l'indique certaines études, tient peut-être aux différences de revenu entre les zones rurales et les centres urbains, différences qui sont énormes dans nombre de pays et qui attirent vers les villes les habitants pauvres du secteur rural en quête d'argent et d'un meilleur régime de vie [8]. Etant donné l'expansion rapide de l'industrie et du commerce enregistrée ces dernières années dans bon nombre de pays africains, il est probable que cet état de choses résulte d'un ensemble de facteurs extrêmement complexes. Il est cependant manifeste que les niveaux de vie, tant réels que relatifs, des petits cultivateurs et des pâtres ruraux ont stagné ou même baissé dans bien des pays [9].

30. La majorité des gens qui émigrent vers les villes sont jeunes. En Egypte par exemple, la proportion des enfants (de 0 à 14 ans) et des jeunes (de 15 à 24 ans) est sensiblement plus forte dans les agglomérations urbaines que dans les campagnes tandis que les vieillards (âgés de 65 ans et plus) forme une plus grande proportion de la population rurale. Cette tendance présente une importance particulière du fait qu'en milieu urbain l'éducation et la formation constituent l'une des conditions préalables du développement et qu'une trop forte proportion de jeunes gens inexpérimentés peut tout autant gêner que favoriser le processus de développement.

31. Au Soudan, grâce à l'exécution de vastes projets agricoles, il se produit aussi des migrations vers les zones rurales. Les migrants proviennent en général du secteur rural traditionnel et, dans une moindre mesure, des petites villes.

32. Cependant, à mesure qu'ils se développeront, les pays africains devront tenir compte de plus en plus de deux types d'accroissement de la population dans le secteur moderne. Dans le premier cas, il s'agit évidemment de l'accroissement naturel de la population déjà établie dans ce secteur. Dans le second, il s'agit des migrations internes d'habitants du secteur rural traditionel que ce soit à destination des zones rurales stables et plus modernes (où se pratique l'agriculture commerciale fondée sur l'irrigation) ou des agglomérations urbaines en expansion, migrations qui s'effectuent à partir d'un secteur où l'on exige peu de l'économie monétaire vers des zones où il faudra répondre aux exigences croissantes dans le domaine des services sociaux et aux normes imposées par le marché du travail.

L'ÉCONOMIE AFRICAINE : LES TENDANCES RÉCENTES ACCUSÉES PAR LES INDICATEURS ÉCONOMIQUES ET SOCIAUX DE LA CROISSANCE

33. Ce sont les principales mesures par habitant dérivées des statistiques de comptabilité nationale qui font ressortir le plus clairement les relations existant entre l'accroissement de la population et le développement économique. Bien que l'efficacité des indices par habitant tirés des comptes nationaux et couramment utilisés dans l'actuel contexte africain soit quelque peu discutable, en raison principalement du grand écart entre la forte proportion de nombreuses populations africaines qui vit encore essentiellement en dehors de l'économie monétaire et la proportion des habitants comprises dans ce secteur, ces mesures constituent néanmoins le meilleur instrument dont on dispose actuellement pour établir des comparaisons internationales et pour évaluer le développement économique [10].

34. Bien entendu, ces chiffres ne correspondent pas aux résultats effectivement enregistrés en différents pays, du fait qu'ils sont fortement pondérés par les données concernant les pays les plus peuplés des différentes régions (par exemple, le Nigéria en Afrique de l'Ouest et le Zaïre en Afrique du Centre) [11].

35. Néanmoins, ces données laissent prévoir que nombre de pays auront de la peine à réaliser effectivement, en ce qui concerne le produit intérieur brut, le taux annuel de croissance de 6 p. 100 que l'Assemblée générale des Nations Unies a proposé comme objectif pour la deuxième Décennie des Nations Unies pour le développement 1970-1980 [12]. D'autre part, les nombreux pays où le taux annuel d'accroissement de la population s'établit environ entre 2,5 et 3 p. 100, devront assurer un tel niveau de croissance économique globale s'ils veulent amplifier sensiblement l'augmentation relativement faible du revenu par tête enregistrée dans les années 60.

Produit intérieur brut

36. Le tableau 5 présente l'évolution des taux de croissance moyenne du produit intérieur brut (PIB) pour les quatre sous-régions d'Afrique au cours de la période allant de 1960 à 1969. On y relève notamment les indications suivantes: premièrement, la lente progression du PIB au cours de la décennie

[8] Voir, par exemple, *Etude des conditions économiques en Afrique, 1969*, partie II (publication des Nations Unies, numéro de vente F.71.II.K.6), en particulier p. 50 et 62.

[9] Cet écart croissant en matière de revenu est signalé dans une étude intéressante des tendances du revenu en Ouganda au cours des années 1963 à 1968. On y indique qu'au sein de l'économie monétaire le revenu réel par tête a diminué d'environ 2,5 à 3 p. 100 parmi les petits cultivateurs africains du secteur commercial, tandis qu'il s'est accru de 8 à 14 p. 100 parmi les salariés africains. Voir à ce propos le document de travail "Demand patterns in East Africa", établi par S. D. Mehta pour la Banque de développement de l'Afrique orientale, Commission économique pour l'Afrique, juin 1970, pp. 7 à 9. La monographie que J. Kantner a rédigée sur la Tanzanie fait état d'une tendance analogue. Voir J. Kantner, "Tanzania: a case study", étude de cas présenté à la Conférence africaine sur la population et à la Conférence des démographes africains, Accra, décembre 1971.

[10] Voir *Etude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente: F.71.II.K.9), p. 21.

[11] *Ibid.*, p. 22.

[12] *Ibid.*, p. 22.

TABLEAU 5 ÉVOLUTION DU PRODUIT INTÉRIEUR BRUT AUX PRIX DE 1960

Sous-régions	*1960-1965*	*1965-1968*	*1968-1969*	*1960-1969*
Afrique du Nord	5,7	4,6	3,0	5,2
Afrique de l'Ouest	4,6	1,5	2,1	3,2
Afrique du Centre	1,5	4,9	5,8	3,0
Afrique de l'Est	4,5	5,4	5,8	5,0

SOURCE. — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F.71 II K 9), p 21

TABLEAU 6 REVENU MONÉTAIRE BRUT PAR HABITANT (base 100 en 1960)

Sous-régions	*1960-1965*	*1965-1968*	*1968-1969*	*1960-1969*
Afriqnue du Nord	3,0	1,6	—	2,4
Afrique de l'Ouest	2,3	1,0	0,4	0,8
Afrique du Centre	0,7	2,7	3,6	0,8
Afrique de l'Est	2,0	2,9	3,3	2,4

SOURCE — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F 71.II K 9), p 21

considérée est particulièrement manifeste, son taux de croissance annuel se situant en moyenne autour de 4 p. 100, chiffre inférieur aux 6 p. 100 généralement considérés comme un objectif minimum pour les pays de la région, si l'on se réfère à la résolution 2626 (XXV) de l'Assemblée générale des Nations Unies sur la deuxième Décennie des Nations Unies pour le développement ; deuxièmement, cela s'est traduit en pratique dans nombre de pays de la région, par un taux de croissance extrêmement faible du PIB réel par habitant.

37 Donc les effets de population apparaissent ici, encore plus nettement. Le fléchissement continu du revenu réel par habitant dans bon nombre de pays africains, témoigne en effet, plus que partout ailleurs, de la forte corrélation qui existe entre la croissance démographique d'une part, et le niveau général du bien-être matériel des populations de la région, d'autre part Le tableau 7 ci-après donne un exemple significatif à cet égard.

38. Par ailleurs, l'extrême variabilité constatée au niveau du revenu par habitant d'une année à l'autre, témoigne de la grande dépendance des économies africaines vis-à-vis d'un secteur agricole essentiellement sujet aux fluctuations considérables que connaissent les prix des produits primaires de base sur le marché international. Ce qui n'est pas sans conséquences particulières étant donné l'importance de la population qui est directement occupée par l'économie agricole

39 Dans le cas du Nigéria par exemple, le secteur agricole occupe jusqu'à 70 p 100 de la population totale du pays

Consommation privée

40. Le niveau de la consommation privée, ainsi qu'il ressort du tableau 12, a eu tendance à diminuer dans l'ensemble du continent au cours des années 1960-1970 En fait, les taux de croissance de la consommation réelle privée ont à peine dépassé les taux d'accroissement de la population dans les quatre sous-régions Les effets de revenu n'ayant pas joué de manière déterminante, en raison de la lente dégradation des pouvoirs d'achat individuels, c'est par conséquent la poussée démographique qui a été, vraisemblablement, la cause principale de l'évolution du niveau de la demande de biens et services dans la plupart des cas. Si dans l'ensemble, cette demande n'a pas beaucoup progressé (exception faite des catégories de classes privilégiées) l'on constate par contre, un accroissement spectaculaire de la demande de certaines denrées alimentaires comme le riz et le maïs, essentiellement des produits de commercialisation et dont la consommation jusqu'alors circonscrite aux centres urbains, a progressivement gagné les zones rurales traditionnellement auto-consommatrices de mil, sorgho et autres céréales. Le changement qualitatif qui s'est ainsi opéré graduellement dans la structure de la demande des produits alimentaires a eu bien souvent pour effet de causer de sérieuses perturbations dans les circuits de ravitaillement de certains pays.

41. De fréquentes ruptures de stocks ont ainsi contraint les responsables à recourir au système de rationnement pour faire face à des pénuries de denrées alimentaires.

Contribution des principaux secteurs au Produit intérieur brut

42. De même, la contribution des principaux secteurs à la formation du PIB montre que l'agriculture continue d'avoir une prédominance fort marquée dans les économies africaines des années 70. Ceci reste vrai même pour des pays comme le Nigéria dont l'économie comporte un important secteur d'industries extractives

TABLEAU 7 ÉVOLUTION MOYENNE DU REVENU MONÉTAIRE BRUT PAR HABITANT AU NIGÉRIA ENTRE 1959 ET 1969

	1959	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*	*1968*	*1969*
Population	2,7	2,9	2,7	2,7	2,8	2,7	2,7	2,8	2,7	2,8	2,5
Revenu par habitant	11,0	2,7	7,8	3,8	1,0	3,0	1,3	7,5	0,3	1,4	1,4

SOURCE. — C. Okonjo, "Population dynamics and Nigerian development", étude de cas présentée à la *Conférence africaine* sur la population et à la Conférence des démographes africains, Accra, décembre 1971.

et pour lequel cependant, le secteur "agriculture et pêche" contribua pour 53 p. 100 du PIB en 1970.

43. La répartition du PIB selon l'origine industrielle est indiquée au tableau 8 pour les quatre sous-régions de l'Afrique. L'importance de l'agriculture dans ce contexte est immédiatement apparente. Dans tous les cas, c'est l'agriculture qui constitue le secteur principal du PIB. En fait, sauf en Afrique du Nord, la contribution de l'agriculture au PIB est deux ou trois fois plus élevée que celle du secteur économique suivant. Cependant, la part de l'agriculture dans le PIB est en réduction dans toutes les sous-régions. Cette diminution s'explique en partie par une croissance assez rapide d'autres secteurs, l'industrie minière en Afrique du nord et de l'ouest et l'industrie manufacturière dans une grande partie de la région, ainsi que par une certaine augmentation de la part du commerce et de l'administration dans le PIB (tableau 8).

44. Une autre raison qui explique la réduction de la contribution de l'agriculture au PIB tient à la lenteur de la croissance dans ce secteur. Le taux d'augmentation moyen du produit agricole pour la dernière décennie n'a pas excédé 3 p. 100 dans aucune des sous-régions de l'Afrique, taux qui a été même très inférieur à ce chiffre en Afrique de l'Ouest et du Centre. Il faut cependant reconnaître que ces chiffres reflètent surtout la production du secteur monétaire de l'économie et déprécient de ce fait, la forte proportion de la production agricole qui est assurée par le secteur de subsistance. D'autre part, les prix de plusieurs des principaux produits agricoles, en particulier sur le marché d'exportation, ont stagné ou baissé au cours de la décennie considérée de sorte que la valeur des denrées agricoles n'a pas augmenté dans toute la mesure possible. Il est néanmoins clair que l'agriculture présente en général une importance primordiale pour le développement futur, en particulier dans les pays qui peuvent encore être considérés comme ayant une économie à tendances agricoles[13]. Ainsi, la possibilité pour un grand nombre de pays africains d'assurer au PIB des taux de croissance élevés au cours des dix ou vingt ans à venir continuera à dépendre davantage de l'augmentation de la production et de la productivité du secteur agricole que des gains réalisés à ce titre, dans des secteurs plus complexes de leur économie.

45. Si l'on envisage le volume par habitant de la production agricole, l'expansion de celle-ci paraît encore plus problématique. Le tableau 10 donne des indices de la production agricole et alimentaire ainsi que de la production agricole et alimentaire par tête pour l'ensemble de l'Afrique et pour trois pays en particulier. Sur la base 100 pour 1952-1956, l'indice de la production globale de denrées alimentaires

[13] Voir *Étude des conditions économiques en Afrique, 1969*, partie II, p. 131 à 137. Dans l'hypothèse où l'agriculture fournirait par exemple 50 p. 100 du PIB, l'industrie 15 p. 100 et les services 35 p. 100, une réduction de 2 p. 100 du taux d'accroissement de la production agricole impliquerait une baisse de 1 p. 100 du taux d'augmentation du PIB, toutes autres choses demeurant égales. Une fluctuation similaire de la production manufacturière, qui forme une fraction beaucoup plus faible du produit national, aurait un effet beaucoup moins important.

TABLEAU 8. ORIGINE INDUSTRIELLE DU PRODUIT INTÉRIEUR BRUT, AUX PRIX COURANTS DES FACTEURS, DANS LES SOUS-RÉGIONS DE L'AFRIQUE POUR 1960, 1965 ET 1969

(en pourcentage)

Sous-régions et années	*Agriculture*	*Industries extractives*	*Industries manufacturières* [a]	*Construction*	*Commerce*	*Transports*	*Services*	*Administration publique*	*Produit intérieur brut (millions de dollars)* [a]
Afrique du Nord									
1960	29,0	4,2	14,8	5,4	15,0	7,0	15,0	9,6	8 897
1965	25,6	11,4	14,4	5,3	12,8	6,9	13,1	10,5	13 306
1969	22,3	17,6	13,3	5,5	12,3	5,4	12,6	11,0	17 785
Afrique de l'Ouest									
1960	55,1	2,4	6,3	5,0	13,2	5,0	6,1	6,9	6 314
1965	48,1	5,1	8,2	5,2	14,5	5,1	7,3	6,5	9 033
1969	46,3	4,2	11,1	5,0	14,0	4,6	8,1	6,7	11 068
Afrique du Centre									
1960	40,0	5,3	12,1	3,8	13,7	6,2	7,1	11,8	2 332
1965	35,1	4,8	13,3	4,2	15,1	5,6	8,5	13,4	2 715
1969	33,2	6,5	15,8	4,5	15,5	5,4	7,1	12,0	3 567
Afrique de l'Est									
1960	44,5	8,0	7,2	4,7	11,4	5,8	12,4	6,0	4 293
1965	43,1	6,2	8,7	4,5	12,7	5,8	12,0	7,0	5 847
1969	37,8	7,1	10,3	5,1	12,7	6,4	13,6	7,0	7 757

SOURCE. — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F.71.II.K.9), p. 27.

DANS LES SOUS-RÉGIONS DE L'AFRIQUE

(en pourcentage par an)

Sous-régions et années	*Agri-culture*	*Indus-tries extrac-tives*	*Indus-tries manu-factu-rières* [a]	*Cons-truc-tion*	*Com-merce*	*Trans-ports*	*Services*	*Admi-nistra-tion publique*
e du Nord								
-1969	2,8	20,8	4,2	5,2	2,9	2,1	2,9	6,9
-1965	3,4	26,7	5,1	5,7	1,9	5,7	2,7	7,1
-1969	2,0	13,8	3,1	4,5	4,2	−2,2	3,2	6,5
-1969	−1,7	6,5	3,6	5,2	3,9	6,2	2,4	7,1
e de l'Ouest								
-1969	1,6	8,9	8,8	2,5	3,4	2,0	5,4	2,6
-1965	2,0	20,7	9,3	4,6	6,1	4,4	7,4	2,9
-1969	1,2	− 4,2	8,1	−0,1	0,0	−1,0	2,9	2,2
-1969	3,4	4,0	5,1	2,3	−2,4	−1,1	−0,4	−0,5
e du Centre								
-1969	0,4	5,9	6,5	3,8	4,0	1,5	3,1	3,2
-1965	−1,7	− 0,4	3,4	1,3	2,6	−1,1	4,8	3,8
-1969	3,0	14,3	10,6	7,0	5,9	4,9	1,1	2,6
-1969	7,2	6,2	8,8	4,4	8,3	6,8	6,6	4,6
e de l'Est								
-1969	2,8	1,4	8,5	5,3	5,5	5,3	5,5	6,0
-1965	3,4	− 1,3	7,9	2,7	5,8	3,9	3,2	6,6
-1969	2,1	5,0	9,4	8,6	5,0	7,0	8,5	5,3
-1969	3,9	20,2	6,4	3,9	2,7	2,5	6,7	3,2

OURCE. — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente .K.9), p 29.

[a] Énergie comprise.

rique a atteint 139 en 1967, mais cette augmen- était à peine égale à celle de la population, l'in- le la production alimentaire par habitant n'ayant lépassé 101. La production agricole globale n'a été plus satisfaisante. Si l'Ethiopie et le Soudan nregistré une augmentation notable du volume des ictions alimentaire et agricole par personne au de la période considérée, l'Egypte a tout juste à se maintenir au niveau antérieurement atteint matière. Dans l'ensemble, si la production de es alimentaires et agricoles destinées à l'expor- avait sensiblement augmenté, plusieurs pays nt probablement enregistré une contraction du ie de la production alimentaire et agricole par ant destinée au marché intérieur.

. Le tableau 11 montre la répartition, par sour- t utilisations, des ressources disponibles dans les e sous-régions de l'Afrique au cours des années D'une manière générale, toutes les sous-régions istraient en 1969 une balance commerciale favo- . Toutefois, la balance commerciale n'était excé- ire que dans quelques pays de chaque sous-région, a majorité des pays d'Afrique en voie de déve- ment importaient encore en 1969 plus de mar- dises qu'ils n'en exportaient [14].

[14] Voir *Étude des conditions économiques en Afrique, 1970*, I, p. 115 et 116.

47. En général, la proportion de la consommation publique s'est accrue au cours des dix années considérées ayant marqué des taux de croissance uniformément plus élevés que ceux de la consommation privée. Il est hors de doute que cet état de choses reflète jusqu'à un certain point l'augmentation des dépenses correspondant au fonctionnement des services sociaux nécessaires. Mais cela traduit également l'ampleur et la portée croissantes des services gouvernementaux en général, situation qui entraîne une expansion relativement rapide du secteur de l'administration publique, particulièrement en Afrique du Nord et de l'Est (tableau 9).

48. Il a été souvent indiqué que le rapport de la formation intérieur brute de capital à la croissance économique diffère entre les pays en voie de développement (essentiellement agricoles) et les pays dotés d'une économie plus moderne. Ce rapport est néanmoins un puissant indicateur du niveau de l'épargne et, partant, de la proportion des ressources qui peut être consacrée aux investissements. Les tendances de la formation intérieure brute de capital au cours de la décennie considérée ont varié entre les différentes sous-régions et surtout entre les divers pays. Au cours de cette période, la formation intérieure brute de capital a absorbé en moyenne 16 à 18 p. 100 des ressources disponibles, soit une proportion quelque peu

TABLEAU 10. NOMBRES-INDICES DE LA PRODUCTION ALIMENTAIRE, DE LA PRODUCTION AGRICOLE TOTALE, DE LA PRODUCTION ALIMENTAIRE PAR HABITANT ET DE LA PRODUCTION AGRICOLE TOTALE PAR HABITANT POUR L'AFRIQUE ET CERTAINS PAYS DE CE CONTINENT, 1948-1967

	1948-1952	*1952*	*1953*	*1954*	*1955*	*1956*	*1957*	*1958*	*1959*	*1960*	*1961*	*1962*	*1963*	*1964*	*1965*	*1966*	*1967*
Production alimentaire																	
Afrique	87	93	98	101	101	107	107	109	113	119	117	124	128	129	130	131	139
Ethiopie	—	91	98	100	100	112	117	114	120	124	127	130	132	136	139	139	144
Soudan	—	83	94	97	108	119	123	128	133	127	128	136	147	147	154	161	186
Egypte	—	85	93	104	106	112	115	112	117	124	117	137	139	141	143	149	146
Production agricole totale																	
Afrique	86	93	97	101	102	107	108	110	115	122	119	127	131	133	135	135	144
Ethiopie	—	91	97	100	101	111	117	114	121	130	132	136	138	145	145	147	152
Soudan	—	80	95	98	107	120	129	115	135	131	129	156	154	141	158	165	191
Egypte	—	95	92	102	103	107	115	106	120	127	112	135	136	141	144	144	140
Production alimentaire par habitant																	
Afrique	95	97	100	101	99	102	100	99	100	103	99	102	103	101	99	98	101
Ethiopie	—	94	99	100	98	108	112	106	111	112	113	114	114	115	115	114	116
Soudan	—	88	97	97	105	112	113	114	115	107	105	108	114	111	113	114	129
Egypte	—	89	95	104	104	107	107	102	104	108	199	103	112	110	109	111	106
Production agricole par habitant																	
Afrique	94	97	100	101	99	103	101	101	102	106	100	105	105	104	103	101	104
Ethiopie	—	94	99	100	99	108	112	106	111	117	118	119	119	123	120	120	122
Soudan	—	84	98	98	104	113	118	102	117	110	106	124	119	106	116	118	132
Egypte	—	100	94	102	101	102	107	105	107	110	95	111	109	111	110	107	102

SOURCE. — Organisation des Nations Unies pour l'alimentation et l'agriculture, *Annuaire de la production, 1968*, p. 27 à 32.

TABLEAU 11 ORIGINES ET UTILISATIONS DES RESSOURCES DANS LES SOUS-RÉGIONS DE L'AFRIQUE, AUX PRIX COURANTS DU MARCHÉ, POUR LES ANNÉES 1960, 1965 ET 1969

(en pourcentage)

Sous-régions et années	*Origines*		*Utilisations*			
	PIB [a]	*Importations-exportations*	*FIBC* [b]	*Consommation privée*	*Consommation publique*	*Exportations-importations*
Afrique du Nord						
1960	92,3	7,7	10,0	72,7	15,0	−7,7
1965	99,9	0,1	18,2	64,6	17,3	−0,1
1969	103,3	−3,3	17,5	60,4	18,8	3,3
Afrique de l'Ouest						
1960	96,7	3,3	12,8	80,2	10,3	−3,3
1965	97,5	2,5	14,9	77,4	10,2	−2,5
1969	101,7	−1,7	13,7	73,1	11,5	1,7
Afrique du Centre						
1960	103,3	−3,3	15,3	65,7	15,7	3,3
1965	101,7	−1,7	15,4	64,6	18,3	1,7
1969	100,7	−0,7	20,3	61,3	17,7	0,7
Afrique de l'Est						
1960	100,4	−0,4	14,8	74,0	10,8	0,4
1965	100,6	−0,6	15,6	70,8	13,0	0,6
1969	101,6	−1,6	18,1	66,9	13,4	1,4

SOURCE — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F 71 II K 9), p 278 et 279

[a] Produit intérieur brut

[b] Formation intérieure brute de capital

inférieure au taux indicatif de 20 p. 100 prévu pour la deuxième Décennie des Nations Unies pour le développement[15]

Agriculture et industries extractives

49. Bien que la population urbaine en Afrique ait notablement augmenté ces dernières années, une grande majorité des habitants de la plupart des pays africains réside encore dans les zones rurales et continuera d'y demeurer durant nombre d'années à venir. D'autre part, une forte proportion de la population rurale se trouve effectivement en dehors de l'économie monétaire, vivant surtout de l'agriculture de subsistance et de petits commerces locaux. Il serait peut-être plus exact de considérer que ces petits cultivateurs appartiennent au secteur traditionnel plutôt qu'au secteur de subsistance du fait que, dans plusieurs pays, ils apportent une contribution substantielle au PIB agricole. Les auteurs des monographies concernant l'Ethiopie et le Soudan, par exemple, estiment que le secteur traditionnel a fourni, ces dernières années, près de 50 p. 100 du produit agricole[16] Bien que les données en la matière soient limitées, il y a lieu de penser que, sauf dans quelques autres pays développés du point de vue agricole, comme l'Egypte, et particulièrement dans ceux où la population rurale est très nombreuse, le secteur traditionnel assure probablement une proportion substantielle de la totalité du PIB agricole

50 Néanmoins, la part disproportionnée du produit agricole que fournissent quelques grands exploitants agricoles travaillant à l'échelle commerciale est très sensible. En Zambie, 700 familles européennes ont contribué, en 1964, pour 71 p 100 aux ventes de produits agricoles, contre un taux correspondant de 29 p 100 pour les quelque 450 000 familles africaines qui dépendent de l'agriculture dans ce pays[17] Il est clair que la majorité des agriculteurs africains, qui utilise des méthodes primitives, travaille en dehors des meilleures structures de commercialisation et marque un niveau bas de productivité, assure une part excessivement limitée des ventes agricoles par rapport à l'effectif de ces cultivateurs.

51. Que l'on désigne ce secteur par le terme "agriculture traditionnelle" ou "agriculture de subsistance", le point essentiel demeure bien évident. Dans la plus grande partie de l'Afrique, on relève un large groupe de population qui ne contribue pas effectivement à la croissance du produit économique et qui, de surcroît, se compose de consommateurs tout au plus marginaux et incapables, étant donné leur actuel niveau écono-

[15] Ibid, p. 11

[illegible] opment", étude de cas présenté à la Conférence africaine sur la population et à la Conférence des démographes africains, Accra, décembre 1971

[17] Frederick F Clairmonte, "Towards a strategy of African agriculture", document polycopié

TABLEAU 12. TAUX DE CROISSANCE ANNUELS MOYENS DES RESSOURCES ET UTILISATIONS, EN PRIX CONSTANTS, POUR LES SOUS-RÉGIONS DE L'AFRIQUE

(en pourcentage)

	Ressources			*Utilisations*		
Sous-régions et périodes	*PIB* [a]	*Importations*	*FIBC* [b]	*Consommation privée*	*Consommation publique*	*Exportations*
Afrique du Nord						
1960-1969	5,2	2,3	3,5	3,4	8,1	6,1
1960-1965	5,7	1,2	4,3	3,5	8,7	6,1
1965-1969	4,6	3,7	2,5	3,4	7,4	6,1
1968-1969	3,0	10,8	4,3	3,1	6,1	6,3
Afrique de l'Ouest						
1960-1969	3,2	1,1	3,7	2,3	3,8	3,6
1960-1965	4,6	2,6	7,3	4,0	3,7	3,3
1965-1969	1,5	– 0,8	– 0,7	0,3	4,0	4,0
1968-1969	2,1	10,2	6,7	0,9	1,2	12,2
Afrique du Centre						
1960-1969	3,0	0,7	6,3	2,1	4,6	0,1
1960-1965	1,5	– 2,9	1,3	1,1	4,9	– 3,5
1965-1969	4,9	5,3	12,8	3,4	4,2	4,6
1968-1969	5,8	– 4,8	22,7	5,9	–0,1	–10,9
Afrique de l'Est						
1960-1969	4,9	4,0	7,1	3,9	7,4	4,4
1960-1965	4,5	3,1	5,3	3,6	8,2	3,6
1965-1969	5,4	5,1	9,4	4,2	6,5	5,5
1968-1969	5,8	– 3,6	1,2	2,4	3,5	9,0

SOURCE. — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F.71.II.K.9), p. 275 et 276.

[a] Produit intérieur brut.

[b] Formation intérieure brute de capital.

mique, de profiter des progrès accomplis dans l'industrie manufacturière et le commerce. La stagnation économique des petits cultivateurs et des pâtres nomades, qui constituent dans bien des cas un groupe important, risque d'entraver un développement économique soutenu et généralisé, en atténuant l'effet de la hausse des niveaux de prospérité dans les secteurs les plus dynamiques de l'économie et en réduisant la dimension potentielle des marchés intérieurs qui s'offrent aux biens et services fournis par les entreprises industrielles ou commerciales de type moderne.

52. Il est souvent difficile de séparer en pratique l'agriculture de subsistance de l'agriculture commerciale. Il est hors de doute qu'une certaine proportion des produits cultivés dans les exploitations modernes est destinée à la consommation locale [18]. Pour l'essentiel, les cultivateurs du secteur de subsistance peuvent vendre une partie de leurs produits afin de pouvoir se procurer certains biens indispensables qu'ils ne peuvent fabriquer à la maison. Dans un grand nombre de régions, les petits exploitants agricoles et les cultivateurs relevant du système traditionnel d'agriculture concentrent leurs efforts sur l'acquisition de revenu plutôt que sur les cultures vivrières locales [19]. Néanmoins, les exploitations agricoles qui appliquent des méthodes plus modernes (irrigation, engrais, outillage mécanique), qui pratiquent en général soit une seule culture soit un nombre limité de cultures (ou bien l'élevage) et dont la production est destinée à de grands marchés intérieurs ou extérieurs, fournissent une part disproportionnée du PIB agricole par rapport à la proportion de la main-d'œuvre agricole rurale qu'elles emploient [20].

[18] Notons à ce propos le cas particulier du projet agricole de Gizeria au Soudan. Bien que ce dernier soit orienté vers la production de denrées agricoles d'exportation (coton principalement), 50 p. 100 des terres sont réservées à l'usage personnel des cultivateurs, R.A. Henin, *op. cit.*

[19] Cette observation vaut en particulier pour un certain nombre de productions d'exportation, telles que l'arachide, qui ne font pas l'objet de vastes plans d'irrigation ou qui ne sont pas organisées sous forme de plantations. La culture de l'arachide au Sénégal offre un bon exemple de cet état de chose. P. Cantrelle, "Étude de cas : population et ressources dans une zone rurale du Sénégal", étude de cas présenté à la Conférence africaine sur la population et à la Conférence des démographes africains, Accra, décembre 1971.

[20] Dans la monographie concernant l'Algérie, Léon Tabah met une telle situation en lumière. Sous le régime colonial, la plupart des grandes exploitations commerciales étaient entre les mains des Européens. A partir de 1963, à mesure que les agriculteurs européens ont quitté le pays, ces propriétés ont été reprises par des Algériens. Tabah signale que cela a permis de fournir un gagne-pain à quelque 135 000 cultivateurs à titre permanent et 100 000 ouvriers saisonniers. Il s'ensuit qu'une

(Suite de la note, p. suiv.)

53. L'exécution de vastes projets agricoles, orientés en particulier vers le marché d'exportation, s'est poursuivie durant la dernière décennie Des plantations pour la culture de produits, tels que le caoutchouc et le sisal, avaient été établies dans certaines parties de l'Afrique au cours de la période coloniale Cependant, l'*institution dans bien des pays africains de grands* projets visant à moderniser les techniques de production appliquées aux terres exploitées par des coopératives ou différents cultivateurs a été un phénomène presque exclusivement postcolonial. C'est peut-être l'une des raisons qui expliquent la croissance lente ou modérée de la production agricole au cours des années 60. D'autre part, certaines grandes entreprises, souvent très capitalisées, ne produisent que depuis peu de temps ou sont encore en voie d'établissement. Dans les zones où la culture commerciale est exposée aux caprices de la pluviosité annuelle, les conditions et, partant, les niveaux de rendement ont énormément varié d'une année à l'autre. C'est ce qui ressort du tableau 13, qui indique la production de coton et de sorgho au cours de la période 1962/63—1968/69, dans les zones du Soudan où l'on pratique des cultures pluviales Là où l'agriculture constitue un élément important du produit national brut et où l'industrie auxiliaire se fonde en grande partie sur la production agricole, les variations de la production résultant notamment de mauvaises récoltes qui s'accompagnent en général d'une réduction de la demande effective et de l'épargne intérieure ainsi que d'une dégradation de la balance des paiements, peuvent représenter la différence entre une croissance économique notable et la stagnation de l'économie tout entière [21]. Enfin, comme le montre le tableau 14, qui porte également sur la production de coton au Soudan, les fluctuations des cours mondiaux ont eu un effet marqué sur la valeur des ventes et, partant, en ce qui concerne les exportations, sur les recettes en devises pouvant être réalisées d'année en année. En fait, les prix du coton sont demeurés assez stables à long terme, mais ceux de certains produits agricoles, tels que l'arachide, l'huile de palme et le sucre, ont baissé pendant une grande partie de la décennie 1960-1970, ce qui a défavorablement affecté les recettes d'exportation des pays où ces cultures sont importantes.

TABLEAU 13 CULTURES MÉCANISÉES EN ZONES PLUVIALES, 1962/63-1968/69

Campagnes	Coton			Sorgho		
	Superficie [a]	Production [b]	Rendement moyen	Superficie [a]	Production [b]	Rendement moyen
1962/1963	32,7	4,9	0,15	313,3	126,6	0,40
1963/1964	18,7	2,1	0,11	316,0	102,2	0,24
1964/1965	18,4	2,5	0,14	432,9	154,3	0,13
1965/1966	12,0	2,1	0,17	565,7	152,1	0,14
1966/1967	7,0	1,0	0,14	381,7	79,1	0,15
1967/1968	31,3	3,4	0,11	612,3	257,3	0,14
1968/1969	34,7	3,7	0,10	776,3	217,3	0,12

SOURCE — R. A. Henin, "Population growth and economic development—the Sudan: a case study", étude de cas présenté à la Conférence africaine sur la population et à la Conférence des démographes africains, Accra, décembre 1971

[a] En milliers de feddans (1 feddan = 58 ares environ)

[b] En milliers de tonnes.

TABLEAU 14 INDICES DE LA QUANTITÉ, DU PRIX ET DE LA VALEUR DES EXPORTATIONS DE COTON ASSURÉES PAR LE SOUDAN ENTRE 1949 ET 1961

(*base 100 en 1949*)

Année	Quantité	Prix	Valeur
1949	100	100	100
1950	102	117	120
1951	146	163	239
1952	85	178	152
1953	138	101	140
1954	93	121	[illegible]
1955	145	109	[illegible]
1956	176	124	[illegible]
1957	96	125	[illegible]
1958	120	97	[illegible]
1959	275	76	[illegible]
1960	161	[illegible]	[illegible]
1961	163	[illegible]	[illegible]

[illegible] des démographes africains, Accra, [illegible]

population totale d'environ 1 million de personnes tire ses moyens d'existence de quelque 3 millions d'hectares de terre. [illegible] 1971, p. 25.

54. Néanmoins, la balance globale des échanges visibles s'est améliorée au cours des dernières années. En effet, l'Afrique en voie de développement a progressé à ce titre d'un déficit de 420 millions de dollars [22] en 1965 à un excédent de 1 milliard 430 millions de dollars en 1969. Cela s'explique par une forte expansion des exportations, dont le taux moyen de croissance (10,1 p. 100) s'est approché du pourcentage correspondant des économies de marché développées et a nettement dépassé celui qu'a marqué le reste du monde en voie de développement, ainsi que par le ralentissement des importations, dont le taux d'augmentation (4,3 p. 100) a été bien inférieur à celui qu'on a enregistré dans les économies de marché développées ou dans l'ensemble du monde en voie de développement [23].

55. Malgré la baisse des prix de certains produits agricoles, les termes de l'échange pour l'ensemble de l'Afrique en voie de développement se sont améliorés dans les dernières années 60. Les termes de l'échange mesurent essentiellement le pouvoir d'achat, en matière d'importation, des recettes d'exportation et constituent, par voie de conséquence, un indicateur des prix relatifs.

56. Il faut cependant noter que l'augmentation spectaculaire des recettes d'exportation a été influencée par un nombre relativement limité de produits non agricoles, au premier rang desquels figurent le pétrole et le cuivre. La part du pétrole dans les exportations globales de l'Afrique en voie de développement, qui était de 3,8 p. 100 seulement en 1963, a atteint 28,3 p. 100 en 1969, ce qui représente un taux annuel moyen de croissance de plus de 23 p. 100 [24]. Cette progression a, bien entendu, éclipsé l'accroissement beaucoup moins rapide des exportations de nombreux produits agricoles. L'importance des industries extractives ressort également du fait qu'en 1968, pour la première fois, la valeur des exportations de pétrole et d'autres produits minéraux représentait plus de 50 p. 100 de toutes les exportations en provenance de l'Afrique considérée dans son ensemble [25].

57. Avant de quitter le secteur des industries extractives, il importe de faire deux observations. Premièrement, si les exportations de pétrole et d'autres produits minéraux constituent un bon moyen d'obtenir des devises dont on a grand besoin, il ne faut pas oublier que ce sont là des ressources épuisables. D'autre part, les industries extractives exigent en général beaucoup de capitaux. Bien qu'il soit dans nombre de cas facile d'obtenir des capitaux étrangers pour ce genre d'opérations, il se peut que cela ne contribue pas notablement à une meilleure distribution du revenu sur le plan intérieur ni à l'amélioration de la compétence de larges couches de la population si les devises étrangères provenant des exportations de produits minéraux ne servent pas à augmenter le degré de développement interne et à en élargir la portée.

58. Deuxièmement, les exportations de produits miniers et l'essor actuel du pétrole et du cuivre en particulier ne concernent qu'un nombre relativement faible de pays. Ces dernières années, le secteur minier a fourni plus de 20 p. 100 du PIB dans six pays seulement de l'Afrique en voie de développement : Libye, Namibie, Zambie, Libéria, Mauritanie et Gabon [26]. Le Zaïre bénéficie notablement, lui aussi, du boom relatif au cuivre depuis 1965. Ainsi, la balance des échanges visibles nettement positive que l'on enregistre pour l'ensemble de la région masque le fait que, dans la majorité des pays d'Afrique en voie de développement (27 des 40 pays pour lesquels on dispose de données), les importations excédaient encore les exportations en 1969 comme elles l'avaient fait pendant la plus grande partie de la décennie considérée [27].

Industries manufacturières et commerce

59. Au cours des années 60, l'expansion en pourcentage des industries manufacturières a été assez rapide dans toute l'Afrique (tableau 9). Dans toutes les sous-régions, sauf en Afrique du Nord où l'effet du pétrole a été prédominant, la production manufacturière a sensiblement accru sa contribution au PIB total. Toutefois, cette augmentation a été réalisée dans la plupart des cas à partir d'une base très limitée de sorte que, dans certains pays, l'institution de seuls quelques grands projets a produit un effet notable. D'autre part, la croissance du secteur manufacturier a été irrégulière d'une année à l'autre, ayant varié selon les pays, ce qui reflète peut-être les dates auxquelles certaines usines ont été implantées ou la situation en d'autres secteurs de certaines économies qui résultait, par exemple, de récoltes favorables ou défavorables.

60. L'expansion de la production manufacturière a porté en grande partie sur les biens de consommation, particulièrement sur les articles de première nécessité et les produits d'exportation. Le nombre des nouvelles entreprises industrielles implantées entre 1967 et 1969 témoigne d'une croissance particulièrement rapide dans certaines branches d'activité telles que préparations et conserves alimentaires textiles, produits dérivés du bois (y compris pâte et papier) et ciment [28].

61. Les industries de transformation ne constituent pas encore un secteur d'emploi important, comme l'indique sommairement le tableau 15, qui donne une estimation de la proportion des salariés dans certains pays africains. Ces chiffres tiennent compte d'une proportion prédominante d'emplois non seulement dans le secteur manufacturier, mais encore dans les industries extractives et la construction ; ils englobent probablement aussi d'importants effectifs de travailleurs dans

[22] L'Afrique en voie de développement englobe tous les pays africains, sauf l'Afrique du Sud.

[23] Voir *Étude des conditions économiques en Afrique, 1970*, partie I, p. 110.

[24] *Ibid.*, p. 355.

[25] *Ibid.*, p. 73.

[26] *Ibid.*, p. 59.

[27] *Ibid.*, p. 345.

[28] *Ibid.*, p. 86 et 87.

TABLEAU 15. NOMBRE D'EMPLOIS SALARIÉS PAR RAPPORT À LA POPULATION, SELON LES DONNÉES LES PLUS RÉCENTES EXISTANT DANS CERTAINS PAYS AFRICAINS

Sous-régions et pays	*Population totale (milliers)*	*Emplois salariés (milliers)*	*Pourcentage de la population totale*	*Pourcentage de la population active*[a]
Afrique du Nord				
Algérie (1968)	12 791	1 148	9,0	22,4
Egypte (1966/1967)	32 944	7 714	23,4	58,4
Afrique de l'Ouest				
Côte d'Ivoire (1965)	4 295	215	5,0	12,5
Mali (1966)	4 640	52	1,1	2,8
Nigéria (1970)	66 174	1 385	2,1	5,2
Afrique du Centre				
République-Unie du Cameroun (1966)	5 370	94	1,8	4,4
Zaïre (1967)	20 267	1 035	5,1	12,8
Afrique de l'Est				
Kenya (1969)	10 581	1 072	10,1	25,3
République-Unie de Tanzanie (1969)	12 886	368	2,9	7,1
Zambie (1968)	3 955	354	9,0	22,4

SOURCE. — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F 71.II.K 9), p 401

[a] Le taux d'activité de la main-d'œuvre est estimé à 40 p 100 de la population totale.

les domaines du commerce, des transports et des services. En tout état de cause, comme on peut le constater, seuls quelques pays atteignent un nombre d'emplois salariés représentant 5 p. 100 de la population totale et, là où existe un niveau approprié d'activité économique, 15 p. 100 de la population active.

62 En Afrique, la croissance du secteur manufacturier a souffert dans bien des cas de dépenses d'investissement imprévues, de faibles économies d'échelle ou de coûts unitaires de production extrêmement élevés. Abstraction faite de toutes autres considérations, les dépenses d'équipement nécessaires pour assurer une capacité productive donnée ont varié considérablement, même au sein d'une certaine industrie qui emploie des techniques normales et bien connues [29].

63. Par conséquent, il s'est révélé difficile dans bien des pays africains de stimuler la croissance des exportations de biens industriels, en particulier de ceux qui représentent un stade de transformation plus poussée que les produits primaires d'exportation. La part des produits primaires dans les exportations totales a diminué au cours des années 60, mais cette réduction a été assez limitée, le taux correspondant étant revenu de 81 à 78 p. 100 [30]. Il est donc clair que, même en présence d'une expansion continue de la production manufacturière, les produits primaires formeront encore, pendant de nombreuses années, la base du commerce extérieur de la majorité des pays africains.

[29] On peut citer comme exemple l'industrie du ciment en Afrique de l'Ouest, où l'investissement pour 100 000 tonnes de capacité annuelle a varié de 1 630 à plus de 10 millions de dollars

[30] Voir *Étude des conditions économiques en Afrique, 1970*, partie I, p 117.

Commerce extérieur

64 L'évolution des relations commerciales du continent avec le reste du monde mérite une attention particulière La situation, actuellement, peut se caractériser par certains faits

65 Premièrement, 25 p. 100 de la production intérieure brute de la région est cédée au reste du monde sous forme d'exportations, tandis que le continent reçoit, au titre de ses importations, pour l'équivalent de 27 p 100 de ses ressources intérieures brutes, ces dernières étant destinées à la consommation finale et au développement de l'infrastructure économique et sociale de la région

66 Deuxièmement, les exportations sont quant à elles, toujours dominées par les productions primaires agricoles (70 p. 100 des exportations totales en 1966) malgré l'intervention de plus en plus importante du secteur minier et de l'industrie extractive : minerais divers et pétrole. De plus, les exportations africaines sont constituées par une gamme extrêmement limitée de produits, à savoir café, cacao, huiles brutes de palmes, arachide, thé, coton, bois et agrumes.

67. Troisièmement, les transactions du continent avec le reste du monde se distinguent encore par leur très grande concentration en direction des courants traditionnels d'échanges auxquels étaient plus ou moins liées les pays de la région avant leur indépendance : soit 50,5 p 100 des exportations et 45,3 p. 100 des importations

68. Quatrièmement, enfin, l'évolution du commerce extérieur africain au cours de la période qui va de 1949 à 1961 montre que les exportations, en particulier, doivent leur régulière progression, non pas aux prix

consentis aux produits africains par le marché international, mais exclusivement du fait de l'augmentation régulière des quantités des produits d'exportation. Le phénomène de détérioration des termes de l'échange affecte donc directement l'économie du continent.

TABLEAU 16. INDICES DE QUANTITÉ, DE PRIX ET DE VALEURS DES EXPORTATIONS AFRICAINES ENTRE 1949 ET 1961

(base 100 en 1949)

Année	Quantité	Prix	Valeur
1949	100	100	100
1950	102	117	120
1951	146	163	239
1952	85	178	152
1953	138	101	140
1954	93	121	113
1955	145	109	159
1956	176	124	219
1957	96	125	120
1958	120	97	117
1959	275	76	211
1960	161	108	174
1961	163	100	163

Balance des paiements et liquidités

69. Etant donné les problèmes que pose dans nombre de pays africains la mobilisation d'un volume raisonnable d'épargne intérieure, l'apport d'aide et de capitaux extérieurs s'est révélé nécessaire pour atteindre un niveau même modeste de formation de capital fixe. Sur les 29 pays d'Afrique en voie de développement où existaient des données précises en 1968, 24 ont enregistré un solde positif en matière de transferts publics, 17 en matière de transferts privés, 20 en matière de capitaux publics et 16 en matière de capitaux privés [31].

70. Bien qu'ils permettent d'atténuer les difficultés de la balance des paiements et d'obtenir des fonds pour le développement intérieur, les apports d'aide et de capitaux étrangers créent certains problèmes particuliers. En premier lieu, une accumulation rapide de prêts "durs" (remboursables en monnaie) entraîne une prompte augmentation de la dette extérieure. En raison du faible niveau de l'épargne intérieure, il pourrait être difficile de mobiliser assez de fonds pour assurer les versements nécessaires qui, même si on parvenait à les effectuer, risqueraient d'absorber une large part des ressources intérieures, d'investissement. En second lieu, lorsque l'investissement nécessaire est assuré par des entreprises étrangères (comme dans le cas de nombreuses opérations d'extraction de pétrole, par exemple), il se peut que la majeure partie du revenu de l'investissement soit retirée sous forme de paiements de transfert courants.

71. Par exemple, le volume considérable des prêts étrangers obtenus par la Côte d'Ivoire a plus que doublé le montant de la dette extérieure de ce pays, qui est passée entre 1960 et 1965 de 8,7 milliards de francs CFA à 20,5 milliards. En 1965, les paiements de transfert en Côte d'Ivoire ont atteint 140 milliards de francs CFA, ce qui représentait près de 40 p. 100 du PIB de ce pays, évalué à 350 milliards de francs CFA [32]. Il n'est donc guère étonnant que beaucoup de pays africains aient encouragé, ces dernières années, l'octroi d'une assistance directe et de prêts "souples" (pouvant être remboursés au moyen d'exportations).

72. La balance globale des paiements a été défavorable dans 24 des 29 pays considérés. En 1969, trois autres pays avaient réalisé une situation favorable en matière de paiements, ce qui portait à huit le nombre total des pays ayant enregistré des comptes courants excédentaires (Libye, Côte d'Ivoire, Zaïre, Gabon, Zambie, Maurice, République-Unie de Tanzanie et Rhodésie).

73. Les déficits enregistrés dans la majorité des pays tenaient principalement au volume considérable des versements de revenus d'investissements à l'étranger, dont il est question ci-dessus, ainsi qu'à des comptes marchandises déficitaires. En 1968, l'Afrique en voie de développement a reçu 1 milliard 396 millions de dollars sous forme de transferts et de capitaux publics, mais le montant net des revenus d'investissements versés à l'étranger s'élevait à 1 milliard 12 millions de dollars. D'autre part, il se peut que le volume considérable des entrées de capitaux ait provoqué un déficit au compte marchandises du fait qu'une partie de ces fonds a certainement servi à effectuer à l'étranger certains achats, en particulier de machines et de matériel de transport ne pouvant être fabriqués sur place [33].

74. La situation de la balance des paiements a été particulièrement défavorable dans les pays dont les avoirs à l'étranger sont en réduction ou s'établissent à un très bas niveau. Seuls huit pays d'Afrique ont pu améliorer notablement leur situation à cet égard en 1968 et 1969. Ces pays comprennent ceux dont la balance commerciale a marqué un excédent appréciable, en grande partie attribuable à leurs exportations de produits minéraux (Libye, Nigéria, Sierra Leone, Zaïre et Zambie), ainsi que trois Etats de l'Afrique de l'Est (Kenya, Ouganda et République-Unie de Tanzanie) où le tourisme ou bien un volume considérable d'investissements publics d'origine étrangère a produit d'heureux résultats.

75. En général, les pays dont les avoirs à l'étranger ont diminué ou stagné ont connu une situation analogue en matière de liquidités internationales. Le tableau 17 présente des données sur les réserves internationales de certains pays africains pour les années 60 et compare le montant des réserves en 1969 à la valeur des importations. Comme on peut le constater, dans plusieurs cas le volume des liquidités en 1969 représentait moins de 20 p. 100 de la valeur des importations, situation

[31] *Ibid.*, p. 357 à 360.

[32] S. Amin, *Le développement du capitalisme en Côte d'Ivoire*, Paris, Les Editions de Minuit, 1967.

[33] Voir *Étude des conditions économiques en Afrique, 1970*, partie I, p. 125.

qui pourrait se révéler fort critique, par exemple, dans une année de mauvaises récoltes alors qu'il faudrait importer soudainement de fortes quantités de produits alimentaires.

76. Cette observation paraît encore plus pertinente lorsqu'on tient compte du fait que, dans une grande partie de l'Afrique, l'augmentation de la production agricole a à peine marché de pair avec l'accroissement de la population et que nombre de pays africains doivent importer des denrées alimentaires, encore qu'ils disposent d'une vaste base agricole. Par conséquent, une ou deux années de mauvaises récoltes, qui influeraient défavorablement sur les recettes d'exportation et entraîneraient la nécessité d'importer des produits alimentaires de base pour nourrir une population en augmentation rapide, pourraient affecter sévèrement la position financière internationale d'un bon nombre de pays africains

TABLEAU 17. LIQUIDITÉS INTERNATIONALES DE CERTAINS PAYS AFRICAINS, 1960-1969, DISPONIBILITÉS EN LIQUIDITÉS À LA FIN DE L'ANNÉE, RÉSERVES INTERNATIONALES

(en millions de dollars des Etats-Unis)

	1960	*1965*	*1966*	*1967*	*1968*	*1969*	*1969 Importations C.A.F*
Afrique du Nord							
Libye	82	246	339	385	539	918	676
Soudan	167	60	57	55	48	36	266
Tunisie	85	36	28	40	36	37	261
Egypte	264	193	156	196	168	145	638
Afrique de l'Ouest							
Ghana	388	132	126	100	113	87	347
Mali		3	—	1	1	1	39
Nigéria	434	246	227	122	126	138	696
Afrique du Centre							
Afrique équatoriale[a]	47	75	66	39	55	55	453
Zaïre	63	21	21	68	138	198	390
Afrique de l'Est							
Ethiopie }	53	77	79	65	66	72	155
Kenya }							327
République-Unie de Tanzanie }	184	143	239	206	246	305	199
Ouganda }							127
Malawi		25	21	23	23	21	74
Zambie		200	211	180	199	369	437

SOURCE — *Étude des conditions économiques en Afrique, 1970,* partie I (publication des Nations Unies, numéro de vente F.71 II K 9), p 395.

[a] Cameroun, Congo, République centrafricaine, Tchad et Gabon

Main-d'œuvre

77. L'accroissement de la population entraîne une augmentation de l'offre de main-d'œuvre au sein de l'économie. Non seulement une population active en augmentation constitue un facteur d'expansion de la production et de croissance économique, mais elle presse l'économie de créer des emplois et le secteur des services d'entreprendre des programmes d'enseignement et de formation pour empêcher le gaspillage des ressources en main-d'œuvre.

78 Même en présence d'une forte croissance de la population urbaine, qui favorise de façon disproportionnée les jeunes adultes, premiers candidats aux em- [illegible] tituent l'agriculture, la sylviculture et la pêche. On estime que les deux tiers environ de la population active en Afrique se livrent à de telles activités, encore que cette proportion varie entre pays et qu'elle ait presque assurément diminué ces dernières années[34].

79 Dans presque toute l'Afrique, les taux d'activité de la main-d'œuvre ont lentement fléchi au cours des dix dernières années. On estime que le taux d'activité brut est tombé d'environ 41 p 100 en 1960 à 39,8 p. 100 en 1965 et 38,9 p. 100 en 1970[35]. Bien que l'activité de tous les groupes d'âge ait eu tendance à baisser, les principales diminutions ont été enregistrées parmi les éléments les plus jeunes et les plus âgés. Les données concernant l'Egypte montrent que les taux d'activité enregistrés pour les jeunes du sexe masculin entre 1937 et 1960 sont revenus de 22,4 p. 100 à

[34] *Ibid*, p 180

[35] *Ibid*, p 179.

12 p. 100 pour le groupe des moins de 15 ans et de 82,4 à 68,5 p. 100 pour le groupe de 15 à 19 ans. Au cours de cette même période, les taux d'activité des hommes de 60 ans et plus sont tombés de 92,5 à 72,4 p. 100, tandis que ceux des hommes compris dans les autres groupes d'âge sont demeurés presque constants. En Egypte, cette tendance était clairement associée à l'urbanisation. Les taux d'activité économique des éléments très jeunes (de moins de 20 ans) et des personnes très âgées (de plus de 60 ans) sont demeurés très élevés dans les zones rurales, tandis qu'ils ont notablement baissé dans les villes, où l'éducation et la formation continues sont requises pour un grand nombre d'emplois et où la retraite devient de plus en plus un fait concret de la vie de travail [36].

80. Les secteurs secondaire et tertiaire de l'économie égyptienne étant relativement bien développés, il est probable que la plupart des autres pays d'Afrique en voie de développement n'ont pas enregistré une réduction aussi forte des taux d'activité. Cependant, une telle évolution des tendances de l'activité économique fait incontestablement partie de la croissance des structures économiques modernes. A mesure que se poursuivra la modernisation et l'urbanisation des pays d'Afrique en voie de développement, les membres de ces groupes d'âge qui deviendront à charge du secteur économique au lieu d'exercer une activité économique imposeront à l'économie des exigences particulières et souvent importantes en matière d'éducation, de santé et autres services sociaux.

81. Il est évident que le rapport entre l'accroissement de la population et la croissance de la main-d'œuvre s'établit au cours d'une période assez longue. Ceux qui se joignent aujourd'hui à la population active sont en général nés il y a 15 ans au moins, de sorte que les tendances actuelles du taux d'accroissement de la population n'affecteront la main-d'œuvre que dans 15 ans ou davantage. Entre 1965 et 1970, l'effectif de la population africaine âgée de 15 à 64 ans est passé d'environ 114 millions à près de 127 millions, marquant ainsi un taux annuel moyen de croissance de 2,1 p. 100. Ce taux, qui est bien inférieur au taux d'accroissement de la population totale de l'Afrique, progressera nécessairement de façon marquée au cours des années à venir [37]. Le fait que beaucoup de pays africains éprouvent des difficultés à faire face même à l'augmentation actuelle du nombre des personnes en quête d'emploi est clairement démontré par l'accroissement du chômage et du sous-emploi dans plusieurs secteurs économiques.

82. La possibilité pour l'économie d'absorber effectivement la main-d'œuvre disponible peut être mesurée par le degré de chômage et de sous-emploi. Malheureusement, comme il n'existe guère de données à ce sujet pour les différentes régions de l'Afrique, la plupart des études en la matière doivent se fonder sur des estimations approximatives. Néanmoins, les problèmes du chômage urbain ainsi que du sous-emploi rural et urbain sont bien connus dans le contexte africain. L'étude économique effectuée au Soudan en 1967 fait état d'une augmentation considérable du chômage dans les grandes villes en 1967-1968. Bien que cela résulte peut-être en partie du retrait d'ouvriers et d'artisans qualifiés de certains projets récemment terminés, certaines données en provenance de Khartoum montrent que plus de la moitié des chômeurs inscrits se composait de migrants non qualifiés en quête d'un emploi urbain de caractère permanent ou temporaire [38].

83. Le sous-emploi pose aussi un grave problème. Dans les sociétés traditionnelles, la question de l'utilisation efficace de la main-d'œuvre n'était peut-être pas importante car, une fois satisfaits les besoins essentiels de nourriture, d'abri, de vêtements et d'ustensiles faits à la maison, la production excédentaire était probablement d'une utilité relativement limitée. Dans une économie plus développée, la situation est tout à fait différente. La nécessité d'assurer un excédent de production pour certaines catégories d'exportations et d'élargir le marché intérieur en haussant le niveau de prospérité par habitant exige une utilisation de plus en plus efficace du potentiel de la population active.

84. Dans les zones rurales, sauf là où le système d'irrigation permet de pratiquer des cultures variées, les travaux agricoles n'absorbent qu'une partie de l'année. Pendant la saison morte, les ouvriers concernés peuvent soit travailler dans leur localité, soit se rendre dans les villes ou d'autres zones rurales pour y chercher du travail. Un grand nombre de ces gens ne peuvent trouver de travail ou s'ils en trouvent, leur temps n'est employé que de façon marginale à des activités commerciales et autres de peu d'importance.

85. Dans les centres urbains, il y a aussi un problème de sous-emploi parmi les résidents permanents, lequel affecte un grand nombre de personnes non qualifiées et souvent illettrées qui, en général, occupent des emplois subalternes ou font de petits travaux. Le problème n'est pas de faire accomplir ces tâches, il tient à l'importance des effectifs qui exercent de telles activités. Il en résulte souvent un niveau de productivité extrêmement bas, alors que les travaux en question pourraient être tout aussi bien exécutés par une main-d'œuvre beaucoup moins nombreuse.

Services sociaux

86. Le développement des services sociaux, particulièrement en matière d'éducation et de santé, est étroitement relié à la politique concernant la main-d'œuvre (qui vise à constituer une main-d'œuvre viable et compétente). Il n'y a pas très longtemps que l'importance de l'éducation et de la formation et d'une meilleure santé, en tant qu'éléments essentiels de la croissance de l'économie moderne, est reconnue dans un grand nombre de plans de développement. On se rend

[36] Farag et El Sayeh, *op. cit.*

[37] Voir *Étude des conditions économiques en Afrique, 1970*, partie I, p. 178 et 179.

[38] R. A. Henin, *op. cit.*

de plus en plus compte qu'il faut faire face à la nécessité d'améliorer les services sociaux pour assurer des disponibilités en main-d'œuvre convenablement formée.

87. Le tableau 18 présente des estimations des effectifs scolaires et de leur pourcentage par rapport à la population totale en 1965 et 1969, pour les établissements d'enseignement primaire, secondaire et supérieur dans les différentes sous-régions de l'Afrique. Comme on peut le constater, tous les secteurs de l'enseignement ont vu leurs effectifs s'accroître au cours de la période considérée Néanmoins, les pourcentages d'inscription scolaire, soit la proportion des enfants d'âge scolaire qui fréquente l'école, demeurent faibles. Pour l'année scolaire 1967/68, seuls quelques pays ont enregistré des taux de 80 p 100 ou plus dans l'enseignement primaire. Dans l'enseignement secondaire, les taux correspondants n'ont dépassé 20 p. 100 que dans deux pays (Maurice et Egypte). La grande majorité des pays, y compris presque tous les pays d'Afrique tropicale, ont enregistré dans l'enseignement secondaire des pourcentages inférieurs à 10 [39].

[39] Voir *Etude des conditions économiques en Afrique, 1970*, partie I, p 185 et 186.

88. Les services sanitaires ont connu une certaine amélioration, mais il faut reconnaître que ce progrès a été réalisé à partir d'une petite base. Deux facteurs sont particulièrement importants dans ce contexte Le nombre de personnes par médecin est généralement très élevé Seuls quelques pays relativement plus avancés comptent un médecin pour 10 000 habitants, tandis que nombre de pays, particulièrement ceux qui enregistrent un faible revenu par habitant et qui sont fortement tributaires de la production agricole, ont moins d'un médecin pour 20 000 habitants. D'autre part, les effectifs de médecins sont excessivement concentrés dans les agglomérations urbaines, de sorte que, dans certains pays, les soins médicaux font presque totalement défaut en dehors des centres urbains. La possibilité pour les universités africaines de former un plus grand nombre de médecins tout en améliorant l'enseignement dans ce domaine étant encore assez limitée, la croissance en la matière a été passablement lente La majorité des médecins, au moins dans la plupart des pays d'Afrique tropicale, sont des étrangers et il est improbable que l'effectif de ces cadres augmente à l'avenir. Bien qu'il existe de grandes possibilités d'assurer la formation d'infirmiers et d'autres catégories de personnel para-

TABLEAU 18 EFFECTIFS SCOLAIRES PAR RAPPORT À LA POPULATION, PAR SOUS-RÉGION AFRICAINE, 1965-1969

(en milliers)

	Afrique du Nord	*Afrique de l'Ouest*	*Afrique du Centre*	*Afrique de l'Est*
1965				
Population	73 989	98 901	37 229	70 800
Effectifs de l'enseignement primaire	7 275	5 791	3 875	4 335
Pourcentage	*9,8*	*5,8*	*10,4*	*6,4*
Effectifs de l'enseignement secondaire .	1 568	605	210	378
Pourcentage	*2,12*	*0,66*	*0,56*	*0,53*
Effectifs de l'enseignement supérieur	217	24	8	16
Pourcentage	*0,27*	*0,024*	*0,022*	*0,022*
1969				
Population	83 300	109 056	40 671	78 169
Effectifs de l'enseignement primaire	8 300	6 450	4 750	5 650
Pourcentage .	*10,0*	*5,9*	*11,7*	*7,4*
Effectifs de l'enseignement secondaire . .	2 240	740	370	600
Pourcentage	*2,70*	*0,68*	*0,99*	*0,77*
Effectifs de l'enseignement supérieur	233	30	18	26
Pourcentage	*0,28*	*0,027*	*0,044*	*0,033*

SOURCE — *Étude des conditions économiques en Afrique, 1970*, partie I (publications des Nations Unies, numéro de vente F.71 II K 9), p. 186.

médical, on n'a pas déployé, par le passé tout au moins, beaucoup d'efforts dans ce domaine, où la croissance a été lente.

CONCLUSION

89. L'analyse de ce premier bilan de développement économique et social en Afrique, de l'indépendance des pays du continent jusqu'aux années 60, amène à un certain nombre de conclusions.

90. En premier lieu, dans la plupart des pays, le planificateur, dans son appréciation des facteurs régissant l'économie du sous-développement, ne semble pas avoir tenu compte, d'une manière suffisamment objective, de l'impact de l'élément démographique sur la croissance économique en général, de même qu'il n'a pas été procédé, sans doute par manque de données appropriées, à une étude suffisamment approfondie des interactions de cette variable avec les autres facteurs du développement. En effet, à quelques rares exceptions près, les plans africains des années 1960-1970 ont à peu près tous cette caractéristique commune: les économistes au lendemain des indépendances nationales, ont aussitôt pris comme clé de voûte des plans de développement africains, des hypothèses aussi optimistes que celles qui consistaient à fixer autour de 6 p. 100 en moyenne, les taux de croissance annuels du produit intérieur brut, alors que persistait encore la prédominance des structures agricoles traditionnelles dans presque tous les pays de la région, et à considérer en même temps, comme facilement réalisable à court terme, un contrôle effectif des niveaux de la consommation intérieure privée, de manière à porter en un temps relativement court, les capacités nationales d'épargne à des taux suffisamment élevés, pour permettre dans une second étape, l'amorce d'un processus de croissance fortement soutenue. Or le bilan réalisé montre aujourd'hui, que de telles hypothèses avaient, de toute évidence, été formulées, sans tenir compte des effets que n'aurait pas manqué d'avoir sur l'ensemble des autres facteurs de la croissance, la situation démographique particulière du continent, tout au long de cette phase de son évolution économique et sociale.

91. Pour beaucoup de pays du continent par conséquent, cette décennie a pu être considérée comme celle du "désappointement" aussi bien aux dires de nombre de responsables gouvernementaux que de l'avis de nombreux spécialistes qui sont préoccupés par les problèmes de développement de la région.

92. En deuxième lieu, il semble donc que l'on devrait retenir, à cet égard, un certain nombre de leçons pour l'avenir :

a) Les changements structurels nécessaires, qui doivent s'opérer au sein d'une économie en voie de développement, en vue de créer les conditions propices à une augmentation soutenue de la production, sont particulièrement lentes à se produire, en raison des contraintes de divers ordres exercées, entre autres, par la poussée démographique sur des facteurs aussi essentiels que l'emploi, la consommation privée, l'épargne et les investissements ainsi que les dépenses publiques en matière de santé et d'éducation. C'est ainsi qu'à l'exception de certains pays comme le Nigéria, l'Algérie et la Libye qui, grâce à l'exploitation des immenses ressources de leurs sous-sols, ont pu disposer de réserves financières importantes pour assurer leur développement, l'on ne peut pas dire encore que l'on assiste à l'amorce d'un processus accumulatif véritable à l'échelle du continent qui soit capable de faire face aux besoins futurs des pays de la région, en matière d'investissements et d'équipements de toutes sortes;

b) Par ailleurs, les niveaux élevés des dépenses des gouvernements, dépenses résultant, entre autres, des effets de charges récurrentes "d'investissements sociaux" considérables, consécutives à la poussée démographique, contrastent vivement avec les résultats atteints par ailleurs, dans ces mêmes domaines, de la santé, de l'éducation et de l'urbanisme. Un net déséquilibre apparaît ainsi, entre les progrès accomplis par les nations africaines d'une part, et le volume global des efforts consentis d'autre part, sous forme d'investissements absorbés par l'appareil économique et social.

c) La particularité de ces mêmes investissements réside dans le fait qu'ils sont pour l'essentiel d'origine extérieure, et en grande partie remboursable, étant donné l'insuffisance actuelle du niveau de l'épargne domestique à l'échelle du continent pour couvrir tous les besoins qui se présentent.

TABLEAU 19. ÉVOLUTION RÉCENTE ET PERSPECTIVE DES PLANS NATIONAUX, EN CE QUI CONCERNE LE PRODUIT INTÉRIEUR BRUT, DANS UN CERTAIN NOMBRE DE PAYS AFRICAINS

Pays	*Taux de croissance annuel du PIB*	
	Passé	*Attendu*
Kenya	3,4	6,3
Madagascar	2,0	4,9
Maroc	3,7	3,7
Ouganda	3,2	6,3
Togo	4,5	5,6
Zambie	5,2	11,7

93. Ainsi, en plus d'une certaine stagnation de la production, l'économie africaine a quelque tendance à s'installer progressivement dans un endettement accentué vis-à-vis de l'extérieur, sans que ces immenses ressources puissent pour autant produire tous les effets escomptés sur l'appareil économique et social. Les niveaux du coefficient marginal de capital atteints dans un certain nombre de pays sont à cet égard, assez significatifs (tableau 20).

94. C'est donc une situation paradoxale qui semble marquer le trait dominant du schéma général de la croissance en Afrique, tel qu'il ressort de l'examen du bilan d'une décennie de développement. L'aide extérieure, en venant de plus en plus au secours de l'appareil économique, a pu servir de volet d'équilibre aux économies de plusieurs pays de la région.

TABLEAU 20. TAUX D'INVESTISSEMENT BRUT ET COEFFICIENT MARGINAL BRUT DE CAPITAL, DANS CERTAINS PAYS AFRICAINS, D'APRÈS LES PREMIERS PLANS NATIONAUX DE DÉVELOPPEMENT

Pays	Taux d'investissement (en pourcentage du PIB)		Coefficient de capital prévu
	Passé	Prévu	
Côte d'Ivoire	12,0	15,0	2,0
Gabon	28,0	26,0	3,5
Kenya	13,0	18,0	2,5
Madagascar	14,0	18,0	3,6
Maroc	13,0	18,0	4,9
Ouganda	13,0	15,0	2,5
Sénégal	14,0	15,0	2,5
Tchad	9,0	13,0	—
Togo	15,0	13,0	2,3
Zambie	11,0	24,0	2,0

SOURCE — *Étude des conditions économiques en Afrique, 1970*, partie I (publication des Nations Unies, numéro de vente F.71.II K.9)

95. Certes, la persistance d'une telle tendance, dans la mesure même où elle peut être considérée comme objectivement incompatible avec la recherche de la pleine souveraineté, n'est pas sans poser de sérieux problèmes en ce qui concerne l'avenir économique et social du continent dans les décennies qui nous séparent encore de l'an 2000.

ANNEXE

Liste des études de cas

Les monographies nationales prises en considération dans le présent document sont les suivantes :

Adadevoh, B Kwaku The effect of small and large numbers of children on the health and welfare of individual families Nigeria (POP/CONF 1/3)

Bekele, Maaza *et* Lars Bondestam. Ethiopia· a case study on the interrelationships of population with social and economic development (POP/CONF 1/4)

Biyong, Boniface Effet de l'accroissement de la population sur la croissance économique (POP/CONF.1/5)

Boute, J Population et développement économique et social en République du Zaïre (POP/CONF 1/13)

Cantrelle, P Etude de cas population et ressources dans une zone rurale du Sénégal (POP/CONF 1/9)

Diakite, Y. Essai d'étude d'un schéma de croissance de l'économique malienne (1965-2000), basé sur différentes hypothèses d'évolution de la population (POP/CONF 1/7)

Farag, A A *et* El Sayeh The demographic and economic aspects of population growth in the United Arab Republic. (POP/CONF 1/2)

Hassouna, W A The impact of small and large numbers of children on the health and welfare of individual families, a micro case study: Egypt (POP/CONF 1/10)

Henin, Roushdi Population growth and economic development, the Sudan a case study (POP/CONF 1/6)

Kantner, John Tanzania a case study (POP/CONF.1/8)

N'Doye, Man Thainer Cas du Sénégal (POP/CONF.1/16)

Sai, F T Family size in relation to family health and welfare, micro case study Ghana (POP/CONF 1/1)

Seklani, Mahmoud Incidences de la baisse de la natalité sur les dépenses de l'éducation le cas de la Tunisie (POP/CONF 1/11)

Tabah, Léon Population et économie de l'Algérie (POP/CONF 1/12)

Young, H Bouterline Summary of a micro case study Tunisia (POP/CONF 1/14)

TABLEAU 21. LES GRANDES TENDANCES D'UNE ÉCONOMIE AFRICAINE TYPE AU MILIEU DE LA PREMIÈRE DÉCENNIE DU DÉVELOPPEMENT

Principaux agrégats	Évolution		
	1959	1965	Indice base 100 en 1959
	(en milliards de francs CFA)		
Production des branches	60,1	63,3	105
Services rendus dans les administrations	5,9	9,6	162
Services rendus dans les "ménages"	0,3	0,3	100
Services rendus dans les institutions financières	0,1	0,1	100
Produit intérieur brut	66,4	73,3	111
Importations	12,0	15,2	127
Total des ressources	78,4	88,5	118
Consommation finale privée	55,3	58,4	105
Consommation publique	7,6	12,5	165
Consommation des institutions financières	0,2	0,2	100
Exportations	9,8	8,3	85
Formation brute de capital fixe	5,5	9,1	174
Total des emplois	78,4	88,5	118
Taux d'investissement (en pourcentage du PIB)	7,0	10,0	
Déficit extérieur (en pourcentage du PIB)	3,4	8,8	

POPULATION AND DEVELOPMENT IN THE ECAFE REGION *

Economic Commission for Asia and the Far East **

1. The Economic Commission for Asia and the Far East (ECAFE) region comprises all the countries in East Asia, Middle South Asia, South-East Asia and most of Oceania. The population of the last-mentioned area represents only 1 per cent of the region's population. [1] In 1970, the Asian part of the region (excluding Oceania) contained 54.3 per cent of the total world population, while occupying only 17 per cent of the world's total land area.

2. From the demographic, economic and social standpoints, the situation in the ECAFE region is one of the most critical in the world. The region has a high rate of population growth, high population density and high level of childhood dependency. Many of the developing countries in the region face serious problems of unemployment, underemployment, low productivity, malnutrition, illiteracy, substandard housing, inadequate medical facilities and poverty.

3. It is estimated that the population of the ECAFE region at the beginning of the twentieth century was 915 million. It increased to 1,994 million in 1970, a more then twofold increase during a period of 70 years. According to the medium variant projections of the United Nations, [2] it is estimated that in the year 2000 the region's population will be 3,569 million, implying a fourfold increase and a net addition of 2,654 million in 100 years. This increase is about 57 per cent of the total increase of the world population during the same period. By the end of the century, the number of inhabitants in the ECAFE region will almost equal the total for the world in 1970.

4. About 78 per cent of the region's population is contained in four countries: China, India, Indonesia and Japan. The remainder is larger than the current population of Africa, North America or Latin America, and is about equal to the present size of the population of Europe. China and India together have about two thirds of the region's total population and more than one third of the world's total population.

Rate of population growth

5. The average annual rate of population growth in the ECAFE region during the 1940s was 0.8 per cent. It rose sharply to 1.9 per cent in the 1950s and is expected to attain a peak of 2.2 per cent in the 1970s. According to the medium-variant projections of the United Nations, the peak period in the ECAFE subregions has been or is about to be reached, as is indicated in table 1.

6. As will be seen in table 2, the region's largest addition will occur in Middle South Asia. Despite a smaller base than that of East Asia in 1965, its population will exceed that of the latter area in 1990, owing to a rate of growth 1.5 times higher. Nevertheless, the population of East Asia alone is expected to be 2.5 times that of Europe at the end of the century.

7. According to the projections, the absolute increase (1,843,154,000) in the region during the 35-

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[1] The ECAFE countries in Oceania are: Australia, British Solomon Islands, Cook Islands, Fiji, Nauru, New Zealand, Papua New Guinea, Tonga and Western Samoa. Since Australia and New Zealand together account for 80 per cent of the total population of Oceania, this paper, in discussing the ECAFE region as a whole, has, for the sake of convenience, merely added the data on those two countries to those of the three Asian subregions (East, Middle South and South-East).

[2] *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4).

TABLE 1. ANNUAL RATES OF GROWTH IN THE ECAFE REGION, 1965-2000

(Percentage)

	1965-1970	*1970-1975*	*1980-1985*	*1990-1995*	*1995-2000*
East Asia	1.8	1.7	1.5	1.2	1.1
Middle South Asia	2.7	2.8	2.5	2.1	1.9
South-East Asia	2.8	2.9	2.7	2.2	2.0
Australia and New Zealand	1.9	2.0	2.0	1.5	1.4

SOURCE: *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4), table A.1.1.

TABLE 2. TOTAL POPULATION AND INCREASE IN THE ECAFE REGION, 1965-2000

(Medium-variant projections)

	Population (thousands)					Total increase
	1965	1970	1980	1990	2000	1965-2000
World total	*3,289,002*	*3,631,797*	*4,456,688*	*5,438,169*	*6,493,642*	*3,204,640*
More developed regions	*1,037,492*	*1,090,297*	*1,210,051*	*1,336,499*	*1,453,528*	*416,036*
Total, ECAFE region	*1,780,109*	*1,994,040*	*2,495,552*	*3,059,538*	*3,623,263*	*1,843,154*
East Asia	851,877	929,932	1,095,354	1,265,342	1,424,378	572,501
Middle South Asia	*664,868*	*761,809*	*1,001,046*	*1,279,761*	*1,564,963*	900,095
South-East Asia	249,349	286,925	380,367	491,775	607,709	358,260
Australia and New Zealand	14,015	15,374	18,785	22,659	26,214	12,199

SOURCE: *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No E 72 XIII.4), table A 1 1, pp. 14-15.

year period, 1965-2000, will be almost 60 per cent of the world increase, and more than the total population of the more developed regions combined (1,453,528,000) at the end of the century. It should be noted that the regional increase will be larger if the gradual decline in fertility for Middle South Asia and South-East Asia, assumed to begin around 1970, does not come about

VITAL STATISTICS

8. Except for Japan, data on the fertility and mortality levels and trends of the larger ECAFE countries are generally unreliable Complete or nearly complete vital registration systems exist only in 10 countries or areas: Australia, Brunei, Cook Islands, Fiji, Hong Kong, Japan, Nauru, New Zealand, Singapore and Sri Lanka. In Malaysia, only the western part has nearly complete data. Altogether, countries which have almost complete registration of vital events comprise only 7 per cent of the region's population; for the remainder, coverage is incomplete in varying degrees. Levels and trends of fertility and mortality can only be estimated, generally on the basis of sketchy and uncertain evidence.

FERTILITY TRENDS AND LEVELS

9. The population trends in the ECAFE region as a whole will depend mainly upon developments with regard to fertility in China in East Asia;[3] in Bangladesh, India and Pakistan in Middle South Asia; and in Indonesia, Malaysia, the Philippines and Thailand in South-East Asia. The uncertainty about any estimate of the birth rate in China renders very difficult the formulation of a conclusion concerning the fertility trends in East Asia. However, the remarkable decline in Japan and the less dramatic reduction in "Other East Asia" are reliably documented [4]

10. The average crude birth rate for Middle South Asia remained unchanged at 44 births per 1,000 population While there has been evidence of a decline in Sri Lanka, from 37 to about 33, the results of nation-wide family planning programmes in India and Pakistan are not yet sufficiently large to be reflected in the deficient statistics of these two countries During the same period, the crude birth rate of South-East Asia has probably dropped slightly, from 46 to 45.[5] Evidence of declining fertility is also found in Singapore and West Malaysia, which have complete birth registration and the oldest established official family planning programmes in the region The birth rate was slightly under 25 by 1968 in the former case and slightly over 35 by 1967 in the latter. Complete birth registration statistics indicate a decline in the birth-rate in Australia, from 22 4 in 1960 to 19.6 in 1965, and in New Zealand, from 26 5 to 22.8.[6]

11 The medium-variant projections took account of the existence of family planning programmes in countries of the ECAFE region and of the fact that fertility decline had already begun in some of the places. As of 1971, 25 countries, accounting for more than 95 per cent of the region's population, either had official population or family planning policies with national programmes or supported family planning activities

12. The levels and trends implied are shown in table 3.

[3] It is presumed that any change in the currently low birth rate in Japan will not have any appreciable effect.

[4] "Interim report on conditions and trends of fertility in the world, 1960-1965, summary of findings" (E/CN 14/POP 76), pp 3 and 9.

[5] *Ibid*, p 8.

[6] *Demographic Yearbook, 1965* (United Nations publication, Sales No. 66 XIII 1), table 12.

TABLE 3. CRUDE BIRTH RATES, BY SUBREGION, 1965-2000

	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000
East Asia	31.5	29.1	25.1	20.9	19.4
Middle South Asia	44.4	42.9	36.6	29.6	26.2
South-East Asia	44.2	42.6	36.9	30.1	26.7
Australia and New Zealand	20.2	21.7	22.6	19.8	19.1

SOURCE: *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4), table A.3.1.

13. As table 3 indicates, a steady decline beginning in the period 1965-1970 has been assumed in the Asian part of the region. The decline is steeper for the Middle South and the South-East than for East Asia. The decreasing trend seems to have halted in Australia and New Zealand.[7] For these countries, a slight increase is shown up to 1980-1985, followed by a gradual decline to around 19 at the end of the century.

MORTALITY LEVELS AND TRENDS

14. It has long been acknowledged that the rapid decline in mortality following the Second World War has changed the course of demographic history. The existence of a decline in death rates unaccompanied by a corresponding trend in birth rates has engendered a rapid increase in the populations of developing countries.

15. As is to be expected, recent estimates indicate that the rate of decline in the crude death rate from 1950-1960 to 1960-1970 was higher in the less developed regions than in the more developed regions: the higher the initial mortality, the greater the potential for a mortality decline with the same level of effort. It is anticipated that, if the food supply and other necessities of life keep pace with the increase in numbers, the less developed regions will have achieved a lower level of mortality by the year 2000 than the more developed regions, owing to the higher proportion of young ages in the former's population. This is illustrated in table 4.

16. In the developing countries, the younger age structure of the population obscures the fact that even further reductions in mortality levels are possible. Expectation of life at birth was estimated to be about 50 years in the Asian part of the ECAFE region during 1965-1970. The medium-variant projections assumed that this would reach 65 years by the year 2000. If this is compared with the current level of 72 years of Australia and New Zealand, there would appear to be a vast potential for the improvement of mortality levels beyond the end of the century. (See table 5.)

[7] Population Division, "Interim report ...", *op. cit.*, p. 5.

TABLE 4. ESTIMATED AND PROJECTED CRUDE DEATH RATES FOR SELECTED REGIONS AND SUB-REGIONS, 1950-2000

(Deaths per 1,000 population)

	1950-1960	1960-1970	1970-1980	1980-2000
More developed regions	10	9	9	10
Less developed regions	22	17	13	9
East Asia [a]	21	16	13	9
Middle South Asia	27	19	14	9
South-East Asia	23	18	13	8
Australia and New Zealand	9	9	8	8
Japan	9	7	7	9

SOURCE: *The World Population Situation in 1970* (United Nations publication, Sales No. E.71.XIII.4), table 6.
[a] Excluding Japan.

AGE STRUCTURE

17. The result of high fertility is not only reflected in the rate of a population's growth, it is transmitted directly to the age structure. High fertility, accompanied by a more rapidly declining mortality in the infant and early childhood ages, has resulted in a young population in many developing countries of Asia today, where the proportions under 15 years are probably the highest in the world (see table 6).

18. The economic significance of age structure lies in the correlation between age and economic activity and productivity. The economically active portion of

TABLE 5. EXPECTATION OF LIFE AT BIRTH IN THE ECAFE REGION, 1965-2000

	1965-1970	1970-1975	1980-1985	1990-1995	1995-2000
East Asia	52.2	55.2	60.8	65.9	68.2
Middle South Asia	48.3	51.3	57.2	62.8	65.4
South-East Asia	49.7	52.7	58.8	64.1	66.4
Australia and New Zealand	71.8	72.1	72.8	73.6	73.7

SOURCE: *World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4), table A.2.1.

TABLE 6. AGE DISTRIBUTION OF THE POPULATION IN THE MORE DEVELOPED COUNTRIES OF THE ECAFE REGION AND BY SUBREGION, 1965-2000

(Percentages)

Area and age group	1965	1970	[illegible]	[illegible]	[illegible]
More developed countries	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0-14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15-64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 and over	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
East Asia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0-14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15-64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 and over	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Middle South Asia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0-14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15-64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 and over	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South-East Asia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0-14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15-64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 and over	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Australia and New Zealand	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0-14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15-64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65 and over	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

SOURCE: Computed from [illegible]

the population consists of young and mature adults while nearly all children belong to the economically inactive. The size of a country's economically active population is one of the most important factors in determining the capacity for development. It has been observed that the level of per capita production [illegible] all other conditions remaining unchanged, a change takes place in the ratio of productive persons, measured by the number of persons in the productive age group to the total population.* As may be seen in table 6, the more developed countries have an economic advantage over the less developed regions in that [illegible] fully [illegible] per cent of their population is in the working age, 15-64. The corresponding proportion in the [illegible]

[illegible]

only non-productive but are heavy consumers of the economy's products.

TRENDS IN THE POPULATION WORKING AGE

20. The ECAFE region is already faced with serious problems of fuller manpower utilization. An average of about 5 per cent, most probably more, of the labour force is currently unemployed in the countries of South-East Asia.[9] The rate in Middle South Asia is probably of a higher order.[10] There appears to be no relief from problems of unemployment in the face of massive increase in the Asian populations of working age. The projections indicate that the population aged 15-64 years will have increased by 126 per cent between 1965 and 2000, with rises in the South-East and the Middle South of 174 and 164 per cent, respectively (see table 8).

21. On the basis of the projections, the International Labour Organisation arrived at the estimates given in table 9.

22. Table 10 sets out the corresponding annual net additions to the labour force.

23. Thus, in the 20 years period 1965-1985, about 70,440 million new jobs will have to be found, or an average of about 3.5 million per annum. For the quinquennial period 1980-1985, the corresponding figure will be approximately 4,240 million, if population growth is to stop adding to the numbers of unemployed and underemployed. These jobs should be provided not only for the yearly additions to the labour force, but also for the enormous backlog of unemployed and underemployed.

[9] Around 1970, the proportion was estimated to be 5.3 per cent in the Philippines, 4.5 per cent in the Republic of Korea and 4.8 per cent in Singapore. *Economic Survey of Asia and the Far East 1972* (United Nations publication, Sales No. E.73.II.F.1), part I, table I-4.

[10] The rate for Sri Lanka was 13.3 per cent in 1969/1970. *Ibid.*

TABLE 8. POPULATION AGED 15-64 YEARS IN THE ECAFE REGION, 1965 AND 2000

	1965	*2000 (thousands)*	*Increase*	*Percentage*
Total	*1,005,979*	*2,277,112*	*1,271,133*	*126*
East Asia	502,810	940,637	437,827	87
Middle South Asia	360,491	951,937	591,446	164
South-East Asia	134,076	367,744	233,668	174
Australia and New Zealand	8,602	16,794	8,192	95

SOURCE: *Compiled from World Population Prospects as Assessed in 1968* (United Nations publication, Sales No. E.72.XIII.4), table A.4.

TABLE 9. LABOUR FORCE PROJECTIONS FOR THE ECAFE REGION, 1965-1985

(Thousands)

	1965	*1970*	*1975*	*1980*	*1985*
Total	*761,804*	*835,384*	*918,117*	*1,008,028*	*1,114,005*
East Asia	393,982	427,912	463,667	497,858	535,592
Middle South Asia	260,064	287,001	318,709	356,662	403,584
South-East Asia	102,169	114,247	128,820	145,876	166,445
Australia and New Zealand	5,589	6,224	6,921	7,632	8,384

SOURCE: Compiled from International Labour Organisation, *Labour Force Projections, 1965-1985* (Geneva, 1971), part I, table 4 and part IV, table 4.

TABLE 10. AVERAGE ANNUAL NET ADDITIONS TO THE LABOUR FORCE IN THE ECAFE REGION, 1965-1985

(Thousands)

	1965-1970	*1970-1975*	*1975-1980*	*1980-1985*	*Total*
Total	*14,716*	*16,547*	*17,982*	*21,195*	*70,440*
East Asia	6,786	7,151	6,838	7,547	28,322
Middle South Asia	5,387	6,342	7,591	9,384	28,704
South-East Asia	2,416	2,915	3,411	4,114	12,856
Australia and New Zealand	127	139	142	150	558

SOURCE: Computed from table 9 above.

24. To create jobs to ensure fuller employment of the magnitude indicated above would require tremendous investment on the part of the countries of the region. In this regard, the future seems bleak:

"During the first half of the 1960s, the developing countries of the region generally increased the share in GNP of both investment and domestic savings. For around 1965, however, the picture has changed. Gross investment for these countries as a whole remained stagnant until 1970 at a level of 17 to 18 per cent of GNP; there was no discernible improvement in 1971 . . . From 1965 to 1970, the total net flow [of external resources] to south and east Asia together fell significantly in both nominal terms and in real terms . . . . Domestic savings, which rose very substantially during the first half of the 1960s, came to a halt around 1965. For the developing countries in the region taken together, the share of gross domestic savings in GNP fell slightly in 1970 as compared with 1965 . . . . Considering the present trend in development aid and assistance, the current rates of domestic savings are thus unsatisfactory in the region as a whole . . . ." [11]

In terms of GNP growth rates, it was concluded that, in general, the achievements of the world's developing countries during the First United Nations Development Decade were satisfactory: the target set was 5 per cent, and their average annual growth rate was about 5.6 per cent. The developing countries of the ECAFE region did slightly less well, 4.9 per cent, although there was an acceleration to 5.7 per cent during the second half of the decade, owing to a breakthrough in agriculture with the introduction of high-yielding varieties of rice and wheat. [12]

25. The achievements during the First Development Decade, and in particular during the second half, sufficed to bring the majority of the region's population above the starvation level and helped to reduce the permanent food crisis of several of the populous countries. This major achievement was not sustained for long. the last two years of the decade have been adversely affected by climatic factors and the nutritional level of large masses continues to be below standard. [13]

26 Unemployment and underemployment, together with low levels of labour productivity, are major factors contributing to the region's low income and widespread poverty. In only one fourth of the ECAFE developing [illegible]

27. At the current time, a very low level of average income in the region's major developing countries extensive mass poverty is inevitable, and as long as *per capita* production is so low, the problem cannot be solved effectively by a mere redistribution of national income Any long-term policy against poverty must emphasize the goal of high rates of growth of GNP *per capita*. [15] Equally important are the goals of reducing rates of population growth. [16]

[11] *Ibid.*, p 2

[12] *Ibid*, p 1.
[13] *Ibid*
[14] *Ibid*
[15] *Ibid*, p. 3
[16] *Ibid*, chap XI

TENDENCIAS DEMOGRAFICAS, DESARROLLO Y DISTRIBUCION DEL INGRESO EN AMERICA LATINA *

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1. En los últimos años se ha venido creando una conciencia cada vez más clara de que los problemas del desarrollo requieren enfoques nuevos y unificados. No se trata ya de plantear la dicotomía analítica entre desarrollo y crecimiento, que no ha perdido su sentido concreto, sino al contrario. Sin embargo, se ha progresado en el terreno analítico y de las políticas pues ahora se entiende al desarrollo como un proceso cuantitativo de crecimiento económico y cualitativo de cambio estructural, proyectado en una dimensión social. En este sentido es necesario plantear en forma explícita la coherencia entre el estilo de desarrollo y el sistema de valores que las sociedades del Tercer Mundo, explícita o implícitamente, tratan de alcanzar. Más concretamente, se trata de la coherencia entre las formas de organización y funcionamiento de la sociedad y la posibilidad que ésta otorga a todos sus miembros para participar en la gestación de las decisiones y en los beneficios que el desarrollo genera.

2. En la mayoría de los países latinoamericanos, incluso del Tercer Mundo, ha habido crecimiento, de acuerdo a diversos indicadores cuantitativos convencionales, como el producto interno bruto, total y per cápita, la producción industrial, las exportaciones e importaciones, u otros. Sin embargo, estos procesos de crecimiento tienen una serie de características que los hacen inaceptables en términos de desarrollo y valores humanos. Entre éstas se destacan: la incapacidad de los sistemas económicos para absorber productivamente sus recursos humanos potenciales; el fracaso para enfrentar las situaciones de pobreza extrema que se derivan tanto de esa incapacidad como de la desigualdad en la distribución del ingreso; la creciente orientación de la estructura productiva hacia la oferta de bienes de consumo destinados a los grupos de altos ingresos, con grave desatención de la producción de bienes esenciales y de uso social; la falta de participación orgánica de la población en la toma de decisiones, no sólo a nivel de las unidades locales, ya sea como productores o consumidores, sino también en la definición de los grandes objetivos nacionales.

3. En verdad, la falta de desarrollo en los términos ya definidos se traduce no sólo en la baja o nula participación de vastos sectores mayoritarios de la población sino también en la falta de estímulos deliberadamente inducidos para incrementar la capacidad racional de estos sectores en la esfera de las decisiones personales y sociales, de manera de facilitar su movilización hacia formas de organización y conducta social que reflejen y articulen más adecuadamente sus necesidades e intereses. Al contrario de esto, los medios de masa y de propaganda política los bombardean con mensajes a menudo alienantes e irracionales que perturban su nivel de realidad, sus prioridades personales y sus orientaciones generales afectando así su capacidad para tomar decisiones autónomas y participar constructiva y creativamente en la vida social. La capacidad para organizarse y presionar por mejores niveles de ingreso, la disposición para ordenar el consumo de acuerdo a sus posibilidades de compra y necesidades individuales y la conducta personal al nivel de la reproducción y la vida familiar suelen así ser profundamente confundidos por las presiones psicológicas que se ejercen a través de los medios de masa, y que restringen el logro de más altos y adecuados niveles de racionalidad y el progreso hacia decisiones personales más responsables y mejor fundadas en los valores e intereses de los individuos de todos los estratos sociales.

4. Un aspecto central de la mayor parte de las experiencias recientes de crecimiento en América Latina es la creciente desigualdad interna en la distribución del ingreso. Este es el caso tanto en países que han experimentado un crecimiento económico muy rápido, modernización industrial e intensa urbanización, como en países de lento crecimiento o predominantemente rurales. Las causas de este fenómeno son variadas y complejas, por lo que no cabe esperar que algunos factores aislados puedan constituir una explicación satisfactoria. Un más adecuado planteo del problema de la concentración del ingreso debe partir de una perspectiva más general que tome en consideración tanto la forma como el ingreso es generado y se difunde en la colectividad como también la estructura de dominación que contribuye a reproducirlo y preservarlo. Un patrón determinado de distribución del ingreso no es un producto arbitrario pues tiene raíces orgánicas en las tendencias históricas y en la coyuntura actual, así como en la estructura social, o sea en los tipos de producción y los niveles de productividad relativos, en las relaciones sociales de producción y las clases sociales, en la estructura de dominación y en la distri-

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bución ecológica de la población, entre otros. No es ajeno a este problema de la concentración del ingreso el hecho de la heterogeneidad estructural de la economía y la sociedad producida por intensos y parciales procesos de modernización que han contribuido a crear profundos abismos de diferenciación interna en términos tanto de productividad como de poder de decisión y, consiguientemente, de riqueza e ingresos personales.

5. Las relaciones entre población y distribución del ingreso son de una gran complejidad ya que sus conexiones no son generalmente directas y en muchos casos no es fácil distinguir con claridad toda la cadena de mediaciones sociales que conectan una y otra dimensión. Además, estas relaciones pueden ser planteadas a varios niveles, con grados tan diversos de generalidad que van desde el nivel macroestructural más amplio de las formaciones sociales globales y los estilos de desarrollo hasta el nivel microsocial más específico del individuo y la familia No cabe aquí sino aludir rápidamente a unos pocos de los muchos problemas y relaciones entre ambos. En primer lugar — y comenzando por lo más general — hay que señalar que un tipo históricamente determinado de formación social implica — aunque en grados diversos — una forma particular de distribución del ingreso y, además, una estructura y dinámica poblacional que le es peculiar Esto no niega que haya problemas comunes, tanto poblacionales como de distribución del ingreso, entre diversas formaciones sociales, ni tampoco la autonomía relativa que tienen, sino que enfatiza la existencia de correspondencias y determinaciones que no se explican al nivel más abstracto de la sociedad en general ni al más concreto de sus contenidos internos. Cómo se distribuye el ingreso, entre qué grupos, que tienen cuáles funciones económicas y sociales, de cuánto poder disponen para acumular y retener ingreso, son problemas cuya resolución contribuye a definir la naturaleza del orden social vigente. La lucha por el ingreso representa una parte importante de la dinámica social y política.

6. Algo semejante ocurre con la población. El tamaño absoluto y relativo de la población, su naturaleza expansiva o regresiva, su distribución ecológica, el grado y la forma como participa en la producción económica, la existencia de excedentes poblacionales (o "ejércitos de reserva") y sus funciones en el mercado de trabajo, son aspectos entre varios que tienen importancia en la configuración del tipo de sociedad, pero son también y en gran parte un resultado de ella. A este nivel no es difícil advertir las relaciones entre estos aspectos poblacionales y la distribución del ingreso; por ejemplo, las que derivan del mercado de trabajo (o de consumo) y su función de colocación de la población en edad de trabajar dentro de la fuerza de trabajo, por un lado, y de asignación de ingresos (salarios) por el otro.

7 A un nivel de menor generalidad, en el otro extremo, aparecen los individuos y las familias como unidades sociales básicas tanto en su carácter de perceptores de ingresos y núcleos de consumo como agentes demográficos fundamentales, que toman decisiones en estos aspectos bajo condiciones de heteronomía variable, de acuerdo a su pertenencia a clase social y a otros tipos de participación social Esta es otra área de convergencia, y de las más importantes, entre población e ingreso, en que se puede suponer la tendencia hacia comportamientos individuales y familiares relativamente coherentes que están condicionados por los grados de racionalidad formal (educación) y de modernización de las actitudes Según alguna evidencia empírica los niveles de ingreso más altos y los patrones de consumo más racionales no son ajenos entre sí y tienden a coincidir con el planeamiento familiar puesto que éste, ahora como siempre, está, entre otras cosas, al servicio de esos objetivos de mejora del ingreso y de su utilización más adecuada de acuerdo a valores sociales y a ciertas preferencias de consumo. Así, se puede suponer que una política distributiva que tienda a homogeneizar los ingresos y las condiciones de vida permitirá una concomitante homogeneización de las pautas reproductivas, mediante un proceso de asimilación hacia abajo de las ahora vigentes en los grupos de medios y altos ingresos, que tienen tasas más bajas de fecundidad

8 El problema es evidentemente complejo y las escasas evidencias empíricas no dan apoyo a todas las conjeturas e hipótesis que es posible hacer al respecto de las conexiones y determinaciones recíprocas entre población e ingreso. Sin embargo, y a modo de síntesis, se puede afirmar que hay una cierta comunidad de raíces y de factores causales que gravitan simultáneamente sobre ambas dinámicas, la poblacional y la del ingreso, y que provienen tanto de la estructura social como de la conducta de las familias e individuos. Su correcta identificación en tanto unidades de una compleja trama social de relaciones constituye uno de los problemas más importantes para la investigación social en este campo y para la fundamentación de estrategias y políticas más adecuadas que las presentes

9. Algunos aspectos a nivel estructural que caracterizan el problema poblacional que se ha venido gestando son el crecimiento y la estructura espacial y de edades de la población, los niveles de participación en la fuerza de trabajo, por edad y sexo; y las demandas de equipamiento urbanos y otros servicios que se generan a partir del proceso de urbanización.

10 En el caso de América Latina, es sabido que la tasa de crecimiento de la población se ha venido incrementando en las últimas décadas, hasta alcanzar un ritmo anual cercano al 2,9 por ciento entre 1960 y 1970. Sin embargo, la evidencia parece indicar que se habría alcanzado la máxima velocidad y que en los próximos años podría esperarse una declinación de esa tasa.

11. Si se consideran las distintas situaciones de países que existen en la región, se constatan tendencias muy diversas En algunos países, las tasas de crecimiento demográfico se han estado reduciendo sistemáticamente. Es el caso de países que a comienzos

década pasada ya tenían tasas moderadas o relativamente bajas (por ejemplo Cuba, Argentina, Chile, Uruguay). En otro grupo de países, en cambio, esas tasas aumentaron, a pesar de que algunas de ellas ya eran muy altas (como la mayoría de los países centroamericanos y Ecuador, Colombia y México).

12. En general, la disminución de las tasas de crecimiento demográfico ha estado asociada a una reducción de las tasas de fecundidad, aunque en algunos casos también se ha manifestado un leve aumento de la tasa de mortalidad cuando ésta ya era muy baja, debido a un relativo envejecimiento de la población. En cambio, en aquellos países en que el crecimiento se ha acelerado, esto ha sido el producto de una fecundidad constante o muy levemente disminuida, combinada con una reducción más notoria en la tasa de mortalidad.

13. Uno de los hechos más relevantes por sus efectos distributivos, es sin duda el patrón espacial que han tenido las tendencias demográficas (sin ignorar obviamente la significación distributiva que tienen las diferenciales de fecundidad según estratos socioeconómicos). Es así como mientras la población rural creció a una tasa anual de 1,5 por ciento entre 1960-1970, la población urbana (de ciudades de más de 20.000 habitantes) aumentó a un ritmo medio anual de 5,3 por ciento en el mismo período. Como resultado, la proporción de la población rural en el total bajó de 67 por ciento en 1960 a 59 por ciento en 1970. Aquí, de nuevo, el promedio para la región oculta una gran heterogeneidad. En un extremo, Uruguay sólo tenía un 30 por ciento de población rural en 1970, mientras que en el otro extremo, en Haití, esa proporción alcanzaba al 93 por ciento.

14. La situación que plantean las altas tasas de crecimiento de la población urbana es en extremo problemática. Por una parte, ellas demandan una expansión de las oportunidades de empleo que los sectores productivos urbanos no han estado en condiciones de ofrecer. En este sentido, el proceso de urbanización en América Latina muestra una característica diferente de las que se dieron en otras experiencias históricas, en cuanto a la velocidad de las migraciones internas. En la experiencia actual de América Latina, en un período histórico muy breve ha tenido lugar una redistribución espacial de la población que en otras situaciones y lugares se realizó durante un tiempo mucho más largo. Este proceso ha sido simultáneo con una tasa de crecimiento demográfico sin precedentes.

15. El fenómeno descrito está siendo acompañado, además, por altas tasas de desempleo abierto en las ciudades, especialmente en las de tamaño intermedio, las que son superiores a las tasas nacionales para la mayoría de los países; el crecimiento más rápido del empleo en los sectores de servicios y comercio, antes que en los sectores productivos y básicos, con grave deterioro de la productividad y aumento del subempleo. Aquí radica una de las causas estructurales del fenómeno de la marginalidad urbana, que viene caracterizando en forma cada vez más intensa el estilo de desarrollo vigente en América Latina.

16. Con todo, a pesar de los bajos ingresos de que disponen las masas urbanas desocupadas o subempleadas, parece ser que alguna forma de cambio en la distribución tiende a operarse a lo largo del proceso de urbanización. Se trata de que la vida urbana da acceso a una serie de beneficios de los que no disponen los sectores rurales. En particular, el acceso a la educación, a la salud y servicios sanitarios, a la recreación y a la vida cultural son beneficios que difícilmente llegan al campo. No menos importante es la posibilidad de diversificar el consumo, en una sociedad que valora en alto grado este objetivo. Esta presunción parece confirmarse con la evidencia de estudios en el Perú, donde la gran mayoría de migrantes hacia Lima estimó en 1967 que su situación había mejorado notoriamente con respecto a la que tenía en sus lugares de origen.

17. ¿Hasta qué punto la economía urbana de estos países va a poder mantener el ritmo necesario de expansión de la infraestructura física y de servicios a fin de satisfacer las demandas de la población creciente? El orden de magnitud de la tarea planteada lo da la estimación de que en la década actual el aumento de población urbana en América Latina será de 75 millones de personas, lo que debe compararse con los 18 millones a los cuales llegó el incremento entre 1960-1970. Las demandas de recursos de inversión pública y privada que esto plantea son muy grandes y en alguna medida ellas compiten con la necesidad de acelerar la expansión de las inversiones en capital fijo y de los sectores directamente reproductivos.

18. En las áreas rurales, el problema no es menos agudo. A pesar de las migraciones internas, la población rural sigue creciendo a tasas apreciables. Ya se indicó el crecimiento promedio anual para América Latina de 1,5 por ciento en la década pasada. Sin embargo, para varios países esa cifra es muy superior, llegando a magnitudes del 3 por ciento anual. El problema de empleo se ha agudizado, por una parte, debido al lento crecimiento de la producción agropecuaria, y por otra, debido a la mecanización agrícola, que se ha estado produciendo en las unidades productivas más grandes y modernas, lo que tiende a reducir la fuerza de trabajo permanente. Además, en la medida que tiene lugar algún crecimiento significativo en los sectores agrícolas, orientados a la exportación, los efectos multiplicadores que se originan de las recaudaciones tributarias se trasladan más bien hacia las ciudades, debido al sesgo urbano que tiene la política fiscal. De no controlarse estas tendencias, es probable que las presiones migratorias se intensifiquen o bien que se incremente la presión demográfica en los sectores rurales de subsistencia, con un mayor deterioro de sus niveles de vida.

19. Como ya fue indicado en un punto anterior, la interacción entre el proceso de desarrollo, el crecimiento demográfico y la redistribución del ingreso es compleja y el grado de conocimiento empírico de que se dispone es todavía muy precario. Aún más, las

generalizaciones que pueden hacerse son a menudo arriesgadas por la heterogeneidad de las situaciones existentes. Pero alguna exploración sobre el tema puede hacerse, aunque en bases muy tentativas.

20. Las influencias derivadas de los cambios en la estructura de edad y sexo de la población que no aparecen de manifiesto en el análisis de tendencias globales, son de particular relevancia a este respecto. Estas influencias se derivan tanto por la calidad de consumidor de bienes o servicios de la población, como por su calidad productora.

21. En cuanto a la capacidad productora y generadora de ingresos de la población, ésta se ve afectada tanto en función de la importancia de la población en edades activas como de las tasas de participación de la población en la fuerza de trabajo. La evidencia disponible indica que en 1970 la proporción de la población en edad de trabajar (de 15 a 64 años) era similar a la de otros países en desarrollo, pero muy inferior a la de países desarrollados. La tendencia durante las dos décadas anteriores fue hacia una leve disminución. Sin embargo, cuando se considera la participación en la fuerza de trabajo, se constata una desventaja notoria en contra de América Latina La población activa llegaba en 1970 a 31 por ciento de la población total, mientras que en el conjunto de las regiones en desarrollo (incluyendo a América Latina) era de 40 por ciento y en los países desarrollados, de 45 por ciento. Esta proporción también tuvo una caída en el período anterior, a consecuencia fundamentalmente de una disminución de la participación de los hombres, la que superó el aumento registrado en la participación femenina

22. A pesar del aumento de la participación femenina, ésta sigue siendo muy baja, comparada con la de otras regiones. De acuerdo a estudios realizados en 1970, ésta llegaba a 19 por ciento en América Latina, comparada con un 33 por ciento en las regiones en desarrollo y 38 por ciento en los países desarrollados. En cambio, la participación de los niños de 10 a 14 años era cinco veces superior a la de países industrializados y la de personas mayores de 65 años, dos veces superior.

23. Desde otro punto de vista, la estructura demográfica se refleja en el coeficiente de dependencia (*dependency ratio*), que mide la relación entre la población menor de 15 y mayor de 65 años, y la población entre 15 y 64 años. Este coeficiente se ha estado incrementando durante las últimas décadas, aunque a tasas decrecientes, lo que muestra una vez más el crecimiento más rápido de la población económicamente improductiva comparado con el de la población total.

24. La caída de la participación global de la población en la fuerza de trabajo a que se hacía referencia antes no obedece sólo a una disminución relativa de la población en edad de trabajar. En parte ella es el resultado de un crecimiento más lento de las oportunidades de empleo que genera el sistema productivo como también de la elevación sistemática de los requisitos de capacitación técnica que se exigen para entrar en la fuerza de trabajo. Estos mayores requisitos no son sólo consecuencia de las necesidades tecnológicas de las actividades económicas, sino también del exceso de oferta de trabajo educado que ha derivado del crecimiento de la enseñanza media general A raíz de esta situación, se ha intensificado el problema del desempleo abierto y disfrazado, a que se hacía referencia antes

25 De lo anterior no debe desprenderse en forma simple la existencia de una asociación inversa estrecha entre grado de instrucción de la población y las tasas de desempleo En efecto, algunos estudios de países indican que el desempleo relativo más alto se encontraba en 1970 entre aquellas personas que habían recibido educación secundaria, mientras que los grupos analfabetos y sin instrucción mostraban tasas de desocupación inferiores al promedio nacional No deben extraerse de aquí generalizaciones en forma apresurada, pero el fenómeno sin duda es significativo y sugiere la existencia de un cierto grado de disfuncionalidad de la *enseñanza media*

26 Por una parte, es necesario ver de qué tipo de *educación se trata y cuáles son sus efectos sobre la* calificación de la fuerza de trabajo en relación con la expansión de la demanda de trabajo La evidencia empírica indica que entre las diversas ramas de la enseñanza media, que en general en América Latina tuvieron una rápida expansión, la participación relativa de la enseñanza media general tuvo un aumento considerable, en detrimento de la enseñanza media técnica y normalista. Puesto que aquélla no llega por igual a todos los *grupos sociales, sino* que beneficia *preferente*mente a los grupos de ingresos medios y altos, cabe preguntarse hasta qué punto se derivan efectos distributivos en favor de los estratos bajos Por otra parte, en la medida que la enseñanza técnica ha estado concebida sobre bases artesanales antes que científico-tecnológicas, lo que repercute en una menor movilidad *ocupacional de los educandos, es cuestionable que* incluso la enseñanza técnica esté ejerciendo efectos distributivos a largo plazo

27. En resumen, el planteamiento de algunas de las tendencias demográficas que han acompañado el proceso de urbanización pone en evidencia la naturaleza compleja del fenómeno y de sus efectos distributivos Ante la carencia de suficiente información empírica, [illegible] se trate, hace que las generalizaciones sean peligrosas y no siempre aplicables Pero, sin embargo, muchos de los problemas que han sido mencionados parecen ser comunes a un gran número de países. En particular, el problema de las migraciones internas y de los muy altos ritmos de aumento de la población urbana parece ser de gran relevancia. Las presiones sobre la economía urbana que esto plantea, a través de la demanda de mayor número de empleos y de servicios y equipamiento urbano, tienden a reproducirse, aunque con variaciones, en regiones muy diferentes. La incapacidad

de los sistemas para dar respuesta a estas presiones tienden a crear un nuevo tipo de segregación, en que un sector creciente de la sociedad va quedando marginado de participar en las decisiones y postergado en los beneficios del crecimiento económico, mientras que otro, minoritario, se moderniza y tiende a imitar e igualar los patrones de vida y de consumo de las sociedades industrialmente avanzadas.

28. De no menos importancia y varios de ellos comunes con el medio urbano, son los problemas que se generan en las zonas rurales, donde todavía sigue radicada la mayor parte de la población de los países del Tercer Mundo. La expansión demográfica sigue siendo alta, en términos relativos, desbordando las posibilidades de generación de empleos en las actividades rurales más productivas. Acelerar el ya intenso proceso migratorio no es una solución, a la luz de los nuevos problemas que esto plantea en las ciudades. De la misma manera que en éstas también allí están presentes las situaciones de marginación social y empobrecimiento relativo debido a los efectos de la concentración del ingreso.

29. Las tensiones poblacionales y sociales que se están creando escapan a las soluciones parciales. Es necesario abordar esta situación a partir de un concepto global de estrategia del desarrollo, en el que se puedan insertar las políticas parciales. En los últimos años se ha estado trabajando intensamente en la elaboración de una concepción globalizadora de los problemas del desarrollo, que rechaza una política de parches y que en cambio enfatiza la necesidad de partir de un enfoque unificado. Las Naciones Unidas han dado un paso muy importante en este sentido al a probar en 1970 la Estrategia Internacional del Desarrollo.

30. Las relaciones entre desarrollo y población constituyen un tema que ha sido objeto de estudio desde muy antiguo en las teorías económicas y sociales. Más recientemente y sobre todo a partir de la segunda guerra mundial, se ha elaborado sobre todo en los países centrales, un conjunto de hipótesis y premisas de carácter neomalthusiano que apuntan hacia los efectos negativos que tiene el rápido crecimiento demográfico sobre el proceso de desarrollo económico-social. De aquí se han desprendido, a veces precipitadamente, conclusiones de política que enfatizan la necesidad de actuar sobre las variables demográficas, a fin de reducir la natalidad, como una manera más rápida y más económica de intensificar el proceso de crecimiento. La constatación de que los grupos literalmente más fecundos son también los más pobres ha provocado dudas sobre el efecto estimulante que la desaceleración poblacional pueda ejercer sobre el ahorro, la inversión y el crecimiento. De manera que la reducción de la expansión demográfica puede ser un alivio a la pobreza pero no contribuye a su erradicación definitiva ni tampoco puede ser vista como un medio para acelerar el crecimiento. En América Latina se ha estado desarrollando una concepción relativamente original de estas relaciones que cuestiona el tratamiento puramente demográfico del problema pues pone en el primer plano las restricciones institucionales, sociales y políticas que pesan sobre el proceso de desarrollo y, entre ellos, destaca los factores que gravitan sobre las variables demográficas. No se trata de desconocer que el crecimiento demográfico de América Latina es extremadamente alto. Pero de ahí se puede concluir rápidamente que la necesidad es reducir su ritmo como si fuera un proceso aislado. De lo que se trata es de plantear cuáles son los verdaderos obstáculos que se han opuesto a un desarrollo *más acelerado e integrador, pues de él* dependerá finalmente el comportamiento demográfico.

31. Una política de desarrollo debe abordar tanto las limitaciones y deficiencias estructurales como las que emanan de los sistemas económicos y sociales vigentes. Sin embargo, no debe excluir las políticas específicas cuya coherencia y eficacia dependerá del grado y la manera como se engarcen en las políticas generales. Por lo tanto, una política demográfica será adecuada en tanto sea una expresión consistente de la politíca general de desarrollo.

32. Un estilo de desarrollo, en el sentido del sistema de valores que una sociedad persigue, los medios y cambios que está dispuesta a emplear y afrontar a fin de desarrollar un determinado patrón de crecimiento es una opción que cada país debe asumir, poniendo en juego sus instituciones y su propio proceso de toma de decisiones. A cada país le tocará definir qué grado y tipo de interacción con el exterior va a aceptar en el campo de la inversión, utilización de recursos y tecnologías, hábitos de vida y consumo, o patrones demográficos. ¿En qué grado se incorporará la población al proceso de toma de decisiones en las diversas esferas sociales, en las empresas, en la definición e implementación de las políticas económicas y sociales, en las instituciones gubernamentales, en el desarrollo de obras de infraestructura y equipamiento urbano y rural? ¿En qué grado y con qué velocidad los resultados del desarrollo de las fuerzas productivas se van a distribuir en beneficio de los diversos grupos de población? ¿En qué medida se va a desarrollar una estructura de consumo que atienda a las necesidades esenciales de la población y reproduzca un estilo de vida acorde con el sistema de valores que la sociedad desea darse? En el contexto de estas definiciones — y de otras relacionadas — debe plantearse el problema de una política poblacional y redistributiva, con amplia participación popular.

33. En relación con los instrumentos y mecanismos y participación, es fundamental distinguir de qué grupos sociales se trata y qué posición tienen en la producción económica y en la distribución del ingreso. Es claro que si se tratara de reducir el proceso de participación a la gestión obrera en las empresas, esto dejaría fuera vastos sectores de población, cuyos medios de subsistencia están ligados a otras actividades. Es el caso, por ejemplo, de los trabajadores urbanos por cuenta propia o de los campesinos. En términos generales, aquí cabría diferenciar claramente entre varios sectores:

los sectores urbanos y rurales, primero; luego, entre los sectores marginados o subempleados y los asalariados de las empresas modernas, en las zonas urbanas; y finalmente entre los sectores ligados a actividades de subsistencia y aquellos que están en actividades de marcado carácter comercial, sea exportador o no, en las zonas rurales. Entre los asalariados que trabajan en empresas modernas las formas más adecuadas de participación se ligan sin duda a los sindicatos, comités de administración, u otros, es decir, mecanismos que se *gestan en el seno de las empresas, en cambio, entre* los trabajadores por cuenta propia urbanos o los de subsistencia, *en zonas rurales, las formas cooperativas,* quizás ligadas a los lugares de vivienda, parecerían ser más adecuadas. En todo caso, esta es una cuestión que sólo puede aclararse a la luz de las experiencias concretas que se están desarrollando en diversas regiones.

34. En un proceso con las características que se han diseñado, adquiere un nuevo sentido la definición de las políticas redistributivas y poblacionales, ya que éstas no serán impuestas sobre la población en forma *a priori*, sino que serán el resultado de definiciones tomadas democráticamente y con la mayor participación

mentales.

35. En otras palabras, lo que se impone es una clara distinción entre los instrumentos de política que se van a utilizar y el contenido y orientación que van a asumir para ser efectiva la estrategia de desarrollo decidida de acuerdo a procedimientos democráticos y con amplia participación social. En lo que se refiere a las políticas redistributivas, por ejemplo, es evidente que las políticas de ingresos y de tributación que tradicionalmente se han aplicado no afectan al total de la población y quedan grupos importantes, como los

pación muy escasa en los mercados, esos instrumentos deberían orientarse en forma mucho más definitiva a la redistribución del consumo efectivo que a sus ingresos monetarios Esto plantea exigencias sobre la orientación de los programas de inversión y de producción, a fin de darle una alta prioridad a la oferta de bienes de consumo esencial. Desde otro punto de vista, plantea exigencias de reformas en la tenencia de la propiedad agrícola y en la organización de la comercialización de los productos, los insumos y los bienes de capital, *teniendo en especial consideración las necesidades de* los campesinos y de los pequeños agricultores.

36 En lo que se refiere a la necesidad de elevar el ritmo de creación de empleos en los sectores modernos, *tanto urbanos como rurales, no sólo se plantean* requerimientos sobre la orientación de las transformaciones *tecnológicas, sino también sobre el* tipo de bienes que se van a producir, recordando que los requisitos de uso de factores productivos son muy variables dependiendo de los productos y de la organización y tamaño de las unidades productivas Se comprende de esta manera que el proceso redistributivo no se agota con la aplicación de algunas medidas directas, sino que afecta a la orientación general del proceso de desarrollo y a la participación efectiva que van a tener los diversos grupos sociales mayoritarios

37. Es necesario definir políticas que favorezcan el aumento de la participación de la mujer en la fuerza de trabajo Como una forma de modificar las pautas reproductivas Se sabe que existe una correlación alta entre trabajo femenino y fertilidad Varios factores contribuyen a trabar el ingreso de la mujer a las ocupaciones, que van desde imágenes y valores sociales relativos a la posición social de la mujer como a la edad y el número de hijos que tiene que cuidar. Se puede *suponer entonces que una mayor tasa de participación* tendría que tener consecuencias inversas sobre la fertilidad *y favorables sobre el ingreso per cápita intra*familiar, por la reducción del coeficiente de dependencia De manera que una adecuada política de empleo femenino puede ser la causa desencadenante de una tendencia hacia el descenso de la natalidad Sin embargo, es difícil que lo sea aisladamente y que para ser efectiva tendrá que ir acompañada de una serie de medidas complementarias que faciliten la reorganización familiar y la provisión de los servicios necesarios en sustitución de los que ahora son provistos por la madre.

38 Es bien sabido también que la estrecha asociación inversa entre los niveles de estratificación socioeconómica y las tasas de fecundidad y el tamaño medio de la familia plantea como una cuestión central de una estrategia poblacional el problema redistributivo. En efecto, están suficientemente comprobadas diversas asociaciones inversas entre la fecundidad de la mujer y sus niveles educacionales, las categorías ocupacionales del marido, la movilidad social, los gastos en consumo y otras variables que caracterizan los niveles socio*económicos de la población Esto hace pensar que una* política redistributiva que actúe a través de esas variables, *y particularmente de la educación, ha de tener* efectos reductores de la fecundidad en los estratos socioeconómicos más bajos Sin embargo, no deben esperarse efectos mecánicos ni inmediatos de tales políticas Por una parte, las asociaciones mencionadas

la línea a partir de la cual el factor estudiado parece comenzar a operar. Estas cuestiones deben ser dilucidadas empíricamente antes de definir políticas específicas para situaciones determinadas, a fin de tomar *adecuadamente en cuenta todas las variables* intervinientes y los diferentes contextos poblaciona' desarrollo. *Además, hay que*

diferido" de muchos de estos factores a la producción de cambios en las actitudes y conductas demográficas.

39. Por otra parte, hay políticas de evidente efecto redistributivo que pueden provocar aumentos de la expansión demográfica. Tal es el caso de las políticas de nutrición y salud destinadas a reducir la mortalidad infantil, de especial incidencia en las grunos sociales más pobres. En estas situaciones parece indispensable complementar dichas medidas con otras políticas destinadas a reducir la fecundidad de esas familias más pobres mediante medidas que produzcan la emergencia de una acción consciente y responsable de las familias, que puede ser el producto de un acceso a la información médica necesaria para poder regular racionalmente los nacimientos y también de una educación que haga conscientes a las nuevas generaciones del concepto de una organización familiar responsable.

40. Las políticas de reducción de la tasa de crecimiento de la población, a través del control de la natalidad y la planificación familiar deben definirse atendiendo a la diversidad de situaciones nacionales y a los derechos de los Estados para adoptar diferentes vías de desarrollo, como se ha planteado más arriba. De ninguna manera resulta aceptable una política destinada exclusivamente a reducir la tasa de natalidad, sin atacar al mismo tiempo todo el complejo de factores causales que traban el crecimiento económico y el desarrollo social.

41. De gran importancia es la necesidad de definir políticas de distribución espacial de la población. A este respecto, es necesario tener en claro que los niveles de población que se alcanzarán en los próximos años están ya determinados por las tendencias demográficas del pasado reciente. De igual manera es necesario tener presente que las mayores presiones se generarán sobre las zonas urbanas, sin que esto signifique un alivio de las presiones ya existentes en las zonas rurales. La concentración demográfica en las grandes zonas metropolitanas tiene efectos diversos sobre la distribución espacial y personal del ingreso, pues produce una concentración de las obras de infraestructura y de los servicios públicos en las ciudades, con grave deterioro de la capacidad de inversión y de la equidad distributiva para con las poblaciones de menor grado de urbanización. La concentración urbana puede llegar a reproducir la amenaza al sistema ecológico que están experimentando los países industrialmente avanzados. De nuevo, es necesario tener presente que esta última preocupación no puede constituirse en la fuerza motriz de una política de redistribución geográfica de la población, sino que debe entenderse en el contexto de un nuevo estilo de desarrollo que sea capaz de generar un buen ritmo de crecimiento económico, que en la composición de su producción se encuentre destinado a favorecer predominantemente a las masas empobrecidas y a las regiones que han permanecido marginadas de los avances y transformaciones sociales y económicas. En el campo de la política regional y espacial, se encuentra una importante confluencia de las políticas demográficas y distributivas.

42. Resumiendo, se puede señalar que en las páginas anteriores se ha examinado de una manera general el problema de las vinculaciones entre población y distribución del ingreso tanto a nivel de algunas de sus conexiones teóricas más importantes como al de varias de las políticas que pueden servir para cimentar cursos de acción destinados a producir modificaciones en el problemático estado actual de ambas dimensiones. Se ha partido de una descripción a vuelo de pájaro de la situación poblacional desde el punto de vista de su estructura y dinámica interna como de sus relaciones con otras dimensiones sociales, como ser, el empleo y la distribución del ingreso. También se ha señalado cómo el individuo y la familia en tanto unidades sociales elementales, tienen una incidencia decisiva en la generación de decisiones que afectan su destino personal y el estado de la sociedad. De manera que la búsqueda de respuestas empíricas y la orientación de las políticas concretas deben comprender un abanico tan amplio y comprensivo de niveles y ambientes sociales que van desde la estructura social global hasta las motivaciones de los individuos y sus tipos de racionalidad.

43. En estos varios niveles se pueden encontrar diversos puntos de confluencia entre población y distribución del ingreso, algunos de los cuales fueron indicados anteriormente. Estas conexiones parecen ser más claras a nivel de las políticas más amplias. Por ejemplo, algunas políticas e instrumentos de distribución del ingreso (educación, salud, nutrición, vivienda) parecen tener grados diversos pero significativos de importancia sobre los patrones de conducta demográfica (fertilidad, mortalidad, tamaño de la familia, etc.). También se ha señalado cómo la racionalidad de los patrones de consumo y de los modos urbanos de vida derivan de bases más amplias de racionalidad en las motivaciones de los individuos y en los procesos sociales que pueden contribuir a un mejor planeamiento y orientación del comportamiento social en lo que se refiere al campo demográfico. La tendencia hacia la integración de estos diversos comportamientos específicos y a la configuración de complejos de acciones de mayor coherencia recíproca y que representan mejor las aspiraciones de los individuos y las políticas sociales, es un proceso que ocurrirá inevitablemente pero con un ritmo que dependerá de la calidad de las políticas coadyuvantes. Se dice a menudo que el elevado crecimiento actual de la población es transicional y que, lo mismo que la concentración del ingreso, son hechos que tenderán a resolverse con el tiempo una vez que ciertos mecanismos correctores espontáneos comiencen a operar. Sin entrar a la discusión sobre la consistencia y eficacia de estos mecanismos parece estar hoy fuera de duda que la gravedad y urgencia de las situaciones planteadas es tal que ni se puede depender — ni menos aún esperar — la acción de sus efectos compensadores. Sin tampoco

asumir *la tesis de la catástrofe inminente* que exigiría rápidas operaciones de cirugía mayor, parece incuestionable *la necesidad de un cuerpo consistente de políticas* orientado por una estrategia general de desarrollo y destinado a atacar desde sus bases los problemas del crecimiento poblacional, ni deseado ni planeado, y de concentración del ingreso y la diseminación de la pobreza

44. Los requerimientos de estas políticas concretas son varios y ya han sido sugeridos antes aunque de una manera esquemática. Cabe ahora solamente recordar sólo unos pocos puntos. El primero se refiere a la necesidad de coherencia interna de las políticas y de complementación recíproca, y externas, de ajustes a objetivos sociales realistas y viables, definidos y escogidos de acuerdo con una estrategia general que implique un estilo de desarrollo y un modelo de sociedad El segundo tiene que ver con el conocimiento necesario, tanto teórico como empírico, que tiene la función de fundamentar y orientar las políticas, mediante el descubrimiento de las conexiones causales esenciales y de las redacciones de los individuos y grupos ante los diferentes tipos de situaciones sociales que las políticas pueden contribuir a crear. Es lamentable pero hay que reconocer que hoy día el conocimiento existente respecto a estos problemas, que se encuentra bien fundado empíricamente, es escaso y a veces inadecuado *cuando no erróneo* Un serio esfuerzo de investigación en este sentido debe ser llevado a cabo con la mayor urgencia

45 Un último punto es el del consenso social tanto *sobre los objetivos de las políticas como sobre los* medios que se emplean para alcanzarlos Está fuera de cuestión la importancia central que un amplio consenso social tiene no sólo en la etapa de la definición de las políticas sino también en la de su implementación Sin una adecuada colaboración popular, el éxito de una política social cualquiera, especialmente en el campo demográfico, corre serios riesgos de fracasar o de producir resultados distintos a los esperados y acaso contraproducentes con respecto a las finalidades perseguidas No se trata solamente de movilizar mecanismos de persuasión colectiva sino de educar y de promover fines que sean real y conscientemente deseados por la sociedad en general, y sus grupos afectados, en particular Se trata nada más ni nada menos que de convertir las utopías dominantes en objetivos sociales y en cursos de acción que sirvan para avanzar en la marcha hacia el bienestar colectivo y una mayor equidad social.

POPULATION AND MODERNIZATION IN LATIN AMERICA *

Economic Commission for Latin America

1. The issue of population policies has to be set against the background of the development process and viewed in terms of strategies for change and alternative notions of what society should be. Because of its implications, it is related, in the immediate present, to questions of short- and medium-term policy. Moreover, it is impossible to formulate the model for future social structures without dealing with such issues as population quality, quantity and location. Population policies inherently touch upon issues that vitally affect the beliefs and value commitments of social groups and classes, have an effect on the ideological framework in relation to which stability and change are gauged, and are associated with a redefinition of the system of human relations, in particular, the function of the family and the social role of women.

2. It is this multiplicity of facets that makes the issue at once so specific and so diffuse; specific when it simplifies into a bare outline of variables, diffuse when exploring its great variety and complexity. The aspects it touches upon can be formalized to a high degree, and yet, it is difficult to understand the significance of such abstractions unless it is remembered that each of them is linked directly not only to the rational orientations of human beings, but to their vital images, identifications and life goals. The success of such policies as Governments may adopt in this field have so far depended rather less upon the political consensus achieved at any particular moment than upon the possibility of persuading individuals and families, subject to the goals set by the particular society, to move and physically to locate themselves in certain areas of the national territory and to plan the size of their families. In turn, the ability to make political consensus a reality at the grass-roots level is dependent upon many factors that, over the short run, generally escape governmental control and that, in any case, respond to the pace and direction of over-all progress.

3. The population problems of Latin America must be viewed against a background of economic and social semi-development. The broad diversity of national situations in the region may be described in terms of a typical pattern of evolution in the sense that, although the social structure and institutions of the rural past have been or are about to be superseded and significant progress has been made in industrialization, it is, nevertheless, difficult to affirm that these countries have as yet established themselves as modern industrial societies.

4. Certain indicators can help to define the nature of this unusual state of affairs. There are significant differences between economic growth and the level of social progress: interrelated sectors corresponding to different stages of the modernization process tend to coexist, and there are indications of a high degree of cultural heterogeneity, as well as sharp contrast in the relative access of social groups and regions to the benefits of technological progress (see table 1).

5. It is difficult to interpret the trend of these indicators, particularly since it has proved all but impossible to project the future direction that countries will take on the basis of recent patterns. The events of the past decade have rendered obsolete the economic and social models that have been the basis for action by Governments and their oppositions for more than 30 years. The basic dilemma arises in determining whether the present situation is just a transitional stage in the complex itinerary of industrial evolution or whether there are indications that the possibilities for significant advances have gradually been exhausted, with progress now depending upon a modification of the rules of the game at the national and international levels.

6. In an atmosphere in which analytical work is concerned less and less with projecting social models and increasingly with identifying the assumptions and incongruencies of these models, giving rise to an almost introspective manner of reflecting on the direction and limits of recent development, the population issue comes to the fore as a result of the search for new strategies and avenues to dispel the ambiguities of this intermediate stage of semi-development. It is clear that the current concern with the issue constitutes an indirect admission of the fact that the development of Latin America has been unbalanced and inadequate, and this, in turn, is prompted by new and higher levels of progress achieved in the region.

7. This growing interest in the population issue springs from three complementary sources: first, the scientific and doctrinal interpretations of economic and social development which, in recognizing the importance of non-economic aspects, must identify the main interrelationships that appear to exist between population trends and over-all progress in order to define the role of population as a factor in development; secondly,

* The original text of this paper (E/CONF.60/SYM.I/39) was submitted to the Symposium on Population and Development, Cairo, 4-14 June 1973.

TABLE 1. INDICATORS OF DEVELOPMENT, BY WORLD REGION, AROUND 1970

World region	Per capita gross domestic product (dollars at 1969 prices)	Per capita consumption of commercial energy, 1969 (kilogrammes)[a]	Life expectancy at birth, 1965-1970	Percentage of adult illiteracy, 1970	Percentage of population in urban agglomerations, 1970
North America			70.5	1.5	62
United States of America	4,574	7,192			
Canada	3,473				
Europe	2,020	2,472	70.9	3.6	47
USSR		2,753[b]	70 3		43
Oceania	2,708	—	64 8	10 3	58
Latin America	510	571	60 2	23 6	38
Asia	130	—	50 5[c]	46.8	22[d]
South Asia	—	—	—	—	16
Africa	190	—	43.3	46 8	16
Other developed countries		2,736			
Rest of the world		216			

...res
...e of petroleum

the evolution of demographic behaviour in different social groups reflects their effort at adapting their life-styles to their concrete possibilities and circumstances within an over-all pattern of semi-industrialization; and, thirdly, the action of Governments expressed through plans, policies and programmes, which respond to some extent to the need to make the macro-strategies for development compatible with the demand for services from family units.

Population and the interpretations of development[1]

Recent situation

8. During the past decade, the concern of Latin American academic circles for population problems followed in the wake of ideological considerations. The most popular analyses of development showed an indirect interest in the problem and incorporated the volume, localization and growth rate of the population as a datum or factor in the formulation of given interpretations of development. Throughout the 1960s, social research institutes and centres tended to limit themselves to demography in the strictest sense, for the most part leaving the study of the relationship between population and development and of policy design to social doctrinists, whose main source of inspiration was the ideological controversy concerning the nature of the social order and the role of Latin American countries in the world system

9. The major arguments advanced by these doctrinists related to the greater or lesser relevance of the population problem to development policies and, in the medium and long term, to the objectives of economic and social change A closer look at the assumptions on which the arguments rest reveals the existence of two trains of thought around which the various positions have been taken. With the realization that both the volume and growth rate of the population have some bearing on the transformation of the economic organization and social structure of countries, an effort was made to assess the impact of demographic factors and, above all, to determine at what point an unduly large population slows down the development process and under what conditions it can be converted into a positive factor for change The inverse relation between those two processes, that is, the effect that the economic and social development of Latin America might have in the near future on demographic trends, has also received considerable attention.

10. In the first case, the arguments are based on certain diagnoses and interpretations of the nature of development; in the second, an attempt is made to form a clearer picture of the significance of the current demographic transition.

Diagnosis of the crisis and the role of demographic growth

11. The state of semi-development achieved by the region indicated that there had not been sufficient progress to resolve several problems inherited from the past, nor to resolve the new problems which were brought on by a greater degree of social differentiation. In those circumstances, it was recognized that the dynamic domestic policy of countries directed towards a more autonomous form of development was at variance with their growing need for resources ech-

[1] See L Ratinoff, "Población y desarrollo en América Latina: evolución de las doctrinas", *Temas del BID*, No. 12, April 1971.

nology and scientific knowledge from the countries at the centre and with their dependency on the world market in raw materials. Rapid but limited growth appeared to have brought about a situation in which development potential was stifled by internal obstacles of a structural and institutional nature. The countries were faced with increasingly serious dilemmas in which they had to choose between social needs and aspirations, and the requirements of general economic efficiency. Moreover, a critical lack of continuity was discernible between the capacity of institutions to mobilize groups and sectors, to bring about agreement among them and to channel their aspirations in a functional manner, and their ability to work towards the achievement of social targets.

The theses

12. As was to be expected, the diagnosis of the crisis took the form of various theses with regard to the possibility for the Establishment to explore new avenues and lay the foundations of a more efficient order. In recent decades, the ideologies that have determined social change in Latin American countries have placed more and more emphasis on the need to run the nation with the greatest possible autonomy and to ensure an increasing participation of the large majority of the population by means of the expansion of the domestic market and the reform of the administrative and political institutions. Naturally, the main differences have been in the intensity of the reforms, the strategy or critical path adopted and the alternative models of social organization.

13. The conservative-developmentist thesis is founded on the potential which the current Establishment offers for rapid development, based on the consolidation of the domestic order, on the concentration of resources and their application to industrialization targets, on attracting foreign investment and on the more efficient exploitation of the markets of the economically advanced countries.

14. Others have stressed the need for the gradual removal, in the medium and long term, of those obstacles of a structural nature that hinder development, that is to say, the creation, at a reasonable economic and social "cost", of the appropriate conditions, incentives and institutions for adjusting the social order to a system of development under which the raising of industrial productivity is compatible with the expansion of the domestic market.

15. The revolutionary thesis predicates that the Establishment's potential has been exhausted and that the future of industrialization resides in the creation of a new system of political and social relationships involving a radical redefinition of the institutions of ownership and the structure of political power.

16. The three theses differ among themselves, both in their interpretation of the relevance of the political and social variables and in their selection of models or projects of society. In the eyes of the conservatives, the consolidation of the political order depends upon the relatively extensive opportunities for economic growth, which in the long term will make it possible to correct the immediate imbalances and sacrifices implicit in development. It accepts, moreover, the model of the capitalist-consumer society which tends towards a twofold expansion of the domestic market, stepping up the consumption of the highest income groups while gradually incorporating those sectors of society which, because of the very speed of the process, stand on the threshold of incorporation. The images that are used to explain the meaning of the transition and of the critical phases are drawn essentially from the study of the processes of modernization that led to the creation of an industrial order in the more advanced countries.

17. The revolutionary viewpoint is that potential economic progress is imprisoned within the existing system of domination and that its liberation entails giving priority to the great task of political transformation and creation involved in the advance towards a socialist system. The model of the future social order is inspired by the revolutionary experience of the socialist countries, and its application to local conditions means resorting to the instruments of analysis and to the guidelines afforded by the revolutionary ideologies.

18. In the view of those who consider that the Establishment is open to the introduction of successive reforms aimed at creating a more functional and just social order, it is essential to strike a balance between economic growth and measures to redistribute benefits and transform the institutional framework. The fundamental logic of this strategy resides in the advantages offered by the step-by-step approach, assuming that the accumulation of successive economic and social changes in a given direction eventually modifies the political system. It is difficult to pin-point the precise model of society that is involved here, inasmuch as it involves the definition of non-revolutionary forms of life and controls, while at the same time accepting the values of a liberal political order. Implicit in this is the notion of some kind of mixed social structure, which is to evolve pragmatically out of the experience of development.

Population and prospective change

19. These forecasts concerning the possibilities of the Establishment in the current situation of semi-industrialization constitute the frame of reference for the Latin American debate on population problems.

20. Traditionally, the doctrine accepted in the region was based on the idea that population growth was a favourable factor for development. The feeling was that population growth helped to increase and diversify demand, generated pressures for a better utilization of resources and stimulated the creation of capacities which were essential in raising over-all productivity. It was affirmed that the environment created

by high population density facilitated the emergence of a modern industrial culture through progress towards social diversification and the division of labour and by creating a scale which oriented and gave meaning to scientific and technological development. It was even accepted that the more rapid replacement of generations helped to accelerate the changes, since better trained young minds had, in fact, new concepts which were more in line with the progress in production and social modernization.

21. It was also believed that only those countries which had attained an appreciable population could play a part in the world balance of power; and that, for all practical purposes, development opportunities should not be unrelated to the place that the nations occupied in the international system. The dilemmas posed by the state of under-development prompted the different groups to revise this traditional conception in the light of their economic and social objectives of change.

Population and conservative developmentism

22. To the more representative sectors of conservative opinion, the high rates of population growth pose a dilemma which is difficult to resolve, since it involves balancing traditional moral considerations against the goal of achieving rapid progress within the established social order. It is recognized that accelerated population growth can give rise to insuperable contradictions between the goals of economic development and social improvement. The extreme view is that population growth conflicts with economic development, since the capacity of social services and institutions and the resources, which can be used for productive purposes, run the risk of lagging behind the demand of a rapidly increasing population.

23. This position does not, however, exhaust the alternative possibilities offered by conservative developmentism. Others accept the importance of the problem, but emphasize that the idea of the "overwhelming" nature of population growth rates is based on the assumption, within the medium term, of a state of mass mobilization. They maintain that, wherever conditions guarantee a period of mediatization of the participation and continuity of the social order, excess population helps to keep wages down Thus, in countries where the domestic market has reached a volume compatible with the level of modern technology, a curb on the rapid rise of industrial wages would be a comparative advantage as concerns exports of manufactures. Furthermore, the population would have additional functions within a strategy of stepping up economic growth. With plentiful natural resources, there would be a greater social capacity for land settlement and, in general, for opening up new frontiers within the country, and for incorporating new factors and possibilities into the economy. Moreover, with the assurance of economic growth during a transitional stage, in a world that must increasingly adopt the scale of production imposed by modern technology, a subsequent phase of redistribution would offer a dynamic reserve of wide possibilities for consolidating whatever development had already been achieved.

Population vis-à-vis revolutionary ethics and practice

24. Revolutionary developmentism focuses on the problem of population growth in a dual perspective. At the level of private conduct, it favours responsible voluntary procreation and, ultimately, the ethics of freedom and equality for women It is accepted that, in pre-revolutionary society, support should be given to efforts providing indispensable services and information to any person requesting them, but by no means should pressures or incentives of the power *élite* to control the birth rate of the broad masses for political purposes be accepted The central idea is that the decisions of couples with respect to the birth rate should reflect a cultural change induced by a larger share in the benefits of progress, so that the full realization of these goals would be possible only in a revolutionary society.

25 At the level of general trends, excess population is considered to be a genuine instrument of change. Like their conservative counterparts, revolutionary ideologies point out that, given a minimum of political mobilization, rapid population growth accentuates pressures on institutions and resources, which, within the dynamics of a social confrontation between the masses and minorities, could help create the general conditions conducive to revolution. In addition, increased population pressure is in itself an incentive to the adoption of new and more progressive criteria of rationality and social justice. These two perspectives are summed up in the assertion that it is only in a revolutionary society, which develops in conformity with these criteria, that general population targets should and can coincide with the decisions of couples concerning the number of children they are to have

Population growth and structural changes

26. With regard to what might be called the structuralist approach to development, one finds that the central issue is defined by the historical singularity of the Latin American situation. Rapid though "insufficient" economic growth over the past three decades had disrupted the traditional balance between birth and death rates, in a context of technological modernization and increased consumer aspirations, induced by the new levels of progress. It thus became necessary to place population problems within this development framework and to determine how far population trends and the dynamics and bottle-necks of progress affected one another, in order to frame realistic policies which considered the part which population growth played in development.

27 These broad guiding principles lead to some general conclusions, which help to define the structuralists' position. The crux of the argument is that the importance of these problems and of a population

policy in Latin America derives from the need to accelerate change, but in no circumstances would such a policy constitute an alternative to efforts directed towards realizing economic and social changes. Moreover, strictly speaking, population policies are apparently inseparable from social policy, and to imagine options which, acting independently, could significantly alter population trends, is completely illusory. On the contrary, the rapid increase in excess population has short- and medium-term consequences which development policy should take into account.

28. The structuralists affirm that, while they accept a development strategy designed to harmonize the need to maximize general economic efficiency with a steady rise in the levels of living of the broad masses, within the medium and long term, population growth rates will have to be compatible with the fulfilment of those objectives. The combination of economic growth and social justice, on the basis of sweeping technological change, presupposes that declining rates of population growth would rapidly be attained.

Images of the demographic transition

29. These conceptions of the role of population in current development conjunctures are based on particular images of the demographic transition. The decision whether or not to intervene in such matters implies that there are priority areas in development plans which are affected by population trends and, furthermore, that these trends reflect the level and nature of the development attained. If one accepts that, beginning from a certain point in the region's recent history, the modification of a traditional state of equilibrium has given rise to a distinctive demographic evolution, then there is reason to wonder what the "natural" course of this transition is, that is to say, what direction the process will assume if unchecked by policies and programmes having a direct bearing on the birth rate.

Self-regulation

30. A widespread interpretation emphasizes the fact that the acceleration of development necessarily leads to the self-regulation of demographic processes, since the birth rate would depend directly upon such variables as school attendance, the incorporation of women into the labour force and the higher aspirations associated with higher income levels. In stressing that the play of factors in the modernization process ultimately leads to a new balance between the birth rate and the mortality rate, it is affirmed, on the one hand, that the demographic transition must necessarily follow the course taken by that process in the industrial countries; and it is suggested, on the other hand, that any attempt to alter the course determined by the forces and factors operating in the transition will bring negative consequences.

The critical phase of indetermination

31. Those who accentuate the importance of internal disequilibria as characteristics of a situation of semi-development, argue that the "natural self-regulation cycle" is neither necessary nor irreversible, since there is a phase of indetermination, which is the result of a lag in the decline of birth rates. Taking it for granted that modern medical practices bring about a historically different demographic situation, it may be concluded that the duration and the possibilities of modifying the trends during the indetermination phase are dependent upon the nature and degree of the disequilibria. Only an environment in which economic policy is based on social modernization measures makes for the creation of the social forces and institutional machinery which help to make birth control programmes successful.

The demographic trap

32. Lastly, there is the position of those who believe that this transition leads towards a cumulative deterioration of certain relationships, and that to give the tendencies free rein necessarily leads to a "demographic trap" which could ultimately come to constitute an insurmountable obstacle to development.

33. The "trap" is the result of the semi-modernized state of society and the lack of synchronization in the rhythm of economic and social changes. When the death rate drops and a traditional birth rate is maintained, an age structure is created which tends to intensify the rate of demographic growth with a sustained increase in the dependent population at the base. In such conditions, the impact of policies to improve the "quality" of the population and assimilate the "marginal" social sectors into productive employment is retarded by the demographic aggravant, thus favouring the conditions leading to a situation of strangulation. The demographic trap thus obliges the State to accept the responsibility of controlling demographic growth as part of general development policy.

SOCIAL STRUCTURE AND DEMOGRAPHIC GROWTH

Demographic trends in the region

34. The level of current information on past trends in the demographic variables which determined the growth and structure of Latin American population is such that only a superficial analysis can be made of the circumstances and the manner in which the process of demographic change has been occurring in the region. The following paragraphs outline a few aspects of demographic growth in the countries of the region during the present century and draw inferences concerning probable future trends within the limitations imposed by the availability and quality of the information, in particular that relating to components of demographic change.

35. Although the growth of population varies greatly from country to country, a high degree of similarity in the trends can be observed. In most countries, the figures show a steady acceleration in the rate of population increase up to 1960 (see table 2). The few countries that depart from the general trend are those in

TABLE 2. LATIN AMERICA: RATES OF POPULATION INCREASE, BY COUNTRY, 1920-1970

Country	*1920-1925*	*1925-1930*	*1930-1935*	*1935-1940*	*1940-1945*	*1945-1950*	*1950-1955*	*1955-1960*	*1960-1965*	*1965-1970*
Argentina	3 17	2 81	1.86	1.67	1 67	2 11	2 05	1.98	1 58	1.56
Bolivia	1.06	1.26	1.45	1 62	1.78	1.92	1.97	2 16	2 29	2.41
Brazil	2 05	2 05	2.05	2 11	2 27	2.55	2.97	3 03	2 86	2 87
Colombia	1.94	1 96	2 03	2.19	2 36	2 65	3 05	3 27	3 32	3 46
Costa Rica	1 61	1 82	2 00	2.35	2 98	3 44	3 74	4 13	3 65	3 05
Cuba	2 66	2 67	1.93	1 58	1.55	2 28	2 13	2 14	2 07	2 00
Chile	1.54	1.61	1.55	1 50	1.54	1 74	2 41	2.40	2 50	2.26
Dominican Republic	1.99	2 16	2 28	2 34	2 62	2 84	3 02	3 20	3 25	3 44
Ecuador	1 14	1 46	1.71	1 91	2 06	2 41	2 83	3 11	3 35	3 41
El Salvador	2 18	2 09	1.19	1 30	1.23	2 05	2 51	2 90	3 04	3 36
Guatemala	1 11	2 94	2.42	1.97	3 36	3 10	2 67	2 82	2 93	2 89
Haiti	1 25	1 39	1.51	1 60	1.78	1 84	1 95	2 15	2 28	2 45
Honduras	1.94	1 92	1.61	1 73	2.01	2 36	2 62	3 18	3 37	3 43
Mexico	0 95	1.76	1.75	1 84	2 88	3 12	2 94	3 20	3 45	3.50
Nicaragua	1 46	1 55	1.74	2 00	2 27	2 55	2 66	3 04	3 06	2 98
Panama	1 58	1 59	0 86	2 57	2.55	2 53	2 89	2 97	3 23	3 27
Paraguay	2 35	2 31	2 34	2 37	1.82	2 01	2 60	2 78	3.24	3.46
Peru	1 47	1.56	1 65	1 72	1.75	1 81	1 98	2 66	3 05	3 12
Uruguay	2 06	2 04	1 50	1 18	1 13	1 30	1 48	1 44	1 35	1 23
Venezuela	1 93	2 17	2 27	2 37	2 84	3 11	3 99	3 92	3 31	3 37
Subtotal (20 countries)	*1 86*	*2 03*	*1 89*	*1.91*	*2.22*	*2.54*	*2 73*	*2 85*	*2 85*	*2 91*
Other countries of the region:										
Barbados	0 13									
Guyana	0 47									
Jamaica	1.52									
Trinidad and Tobago	0 05									
Subtotal, other countries	*0 88*	*1 22*	*1.74*	*1.82*	*1 63*	*1 72*	*1 97*	*2 19*	*2.34*	*2 13*
Total	*1 84*	*2.01*	*1 88*	*1.91*	*2.21*	*2 52*	*2 71*	*2 84*	*2.84*	*2 90*

SOURCE: George Martine and César Peláez, "Population Trends in the 1960s Some Implications for Development", *Economic Bulletin for Latin America*, vol. XVIII, Nos. 1 and 2, 1973

which fertility fell appreciably (Chile) or in which international migration played an important role during a particular period (Venezuela) or in which both phenomena occurred (Argentina, Cuba, Uruguay)

36. These trends are reflected in a growing acceleration of the rate of increase of the region's total population The growth rate came close to its maximum height at the beginning of the 1960s, when the rising trend lost impetus as a result of the slackening of growth in some countries, chiefly Brazil, which together with the continued decline in the rate of increase in Argentina, Chile, Cuba and Uruguay, offset the acceleration in the growth rate that is still occurring in many countries.

37 Except in the cases of Argentina, Cuba, Uruguay and Venezuela, where international migration has been an important factor in growth during given periods, the population of Latin American countries has grown virtually exclusively as a result of natural growth processes.

38. At the beginning of the present century, gross mortality rates in most of the countries of the region probably ranged between 30 and 35 per 1,000, and since then have gradually declined, at different rates in different countries and periods, to currently lower levels. It is estimated that, in 1970, 13 of the 20 countries listed in table 3 had a gross mortality rate of less than 10 per 1,000, and that only two countries had rates higher than 15 per 1,000. There are clear indications that the decline was not uniform over time, rather that it was relatively slow up to about 1930, and slightly faster between then and the Second World War, after which it accelerated appreciably.

39 It is estimated that, at the beginning of the century, birth rates in all countries of the region were above 40 per 1,000, and in many cases over 45 per 1,000. Until recently, all analyses of fertility trends in Latin America have ended up with the generalization that, except for a few countries (Argentina, Chile, Cuba and Uruguay, which are at different but relatively advanced stages of the process of demographic change), "birth rates have remained high—between 40 and 50 per thousand—and there are no symptoms of significant change such as might suggest that a period of decreasing fertility is beginning". [2] It has generally been affirmed that the fluctuations observable in the birth rates of these countries do not reflect real changes in the reproductive behaviour of the population but rather derive from a variety of other factors, such as improvement of records, better health conditions, changes in the level of mortality, increased stability of marriages and

[2] *Social Change and Social Development Policy in Latin America* (United Nations publication, Sales No. E.70 II G 3), p 43.

TABLE 3. LATIN AMERICA: AVERAGE ANNUAL RATES OF NATURAL INCREASE, BIRTHS AND DEATHS, BY COUNTRY, 1960-1970

Country	Population, 1970 (thousands)	Average annual rate of natural increase (per thousand) 1960	1970	Crude birth rate (per thousand) 1960	1970	Crude death rate (per thousand) 1960	1970
Argentina	24,352	1.66	1.52	23.3	22.9	6.7	7.7
Bolivia	4,658	2.30	2.46	44.0	43.8	21.0	19.2
Brazil	93,245	3.03	2.88	39.8	37.3	9.5	8.5
Colombia	22,160	3.29	3.51	45.0	44.0	12.1	8.9
Chile	9,717	2.45	1.96	38.3	27.4	13.8	7.8
Ecuador	6,028	3.23	3.41	46.0	45.0	13.7	10.9
Paraguay	2,419	2.95	3.53	45.0	45.0	15.5	9.7
Peru	13,586	2.85	3.14	43.0	41.0	14.5	9.6
Uruguay	2,889	1.39	1.21	22.0	21.1	8.1	9.0
Venezuela	10,755	3.59	3.26	43.4	40.6	7.5	8.0
Costa Rica	1,736	3.89	2.92	48.0	34.5	9.1	5.3
El Salvador	3,441	2.81	3.44	47.6	46.7	19.5	12.3
Guatemala	5,282	2.88	2.88	47.6	42.5	18.8	13.7
Honduras	2,583	3.12	3.30	46.7	48.3	15.5	15.3
Nicaragua	2,021	3.05	3.12	47.0	46.4	16.5	15.2
Panama	1,406	3.10	3.26	42.1	39.8	11.1	7.2
Mexico	50,718	3.32	3.50	45.0	44.0	11.8	9.0
Cuba	8,341	2.42	2.00	31.5	28.0	7.3	8.0
Haiti	5,299	2.20	2.54	44.0	44.0	22.0	18.6
Dominican Republic	4,348	3.22	3.51	49.1	48.3	16.9	13.2
Total (20 countries)	*274,914*	*2.90*	*2.91*	*40.1*	*38.2*	*11.1*	*9.2*

SOURCE: George Martine and César Peláez, "Population Trends in the 1960s: Some Implications for Development", *Economic Bulletin for Latin America*, vol. XVIII, Nos. 1 and 2, 1973.

changes in the nuptiality rate. In all these analyses, the notion that fertility is closely associated with economic, social, psychological and cultural variables that change slowly in tune with the modernization process, has probably been over-emphasized. It is true that the effect of the factors mentioned above may explain some part or, perhaps, even a significant part of the fluctuations, but it is also increasingly evident that the population of Latin American countries includes socio-economic groups with different levels of fertility, and that these differences, viewed in the context of the process of social change taking place in these countries, must have some influence on the variations observable in the birth rates. This would appear to indicate that the phenomenon of fertility is probably much more dynamic than analyses of birth rates would suggest.

40. Recent studies would seem to bear out this assertion. [3] The cases of Brazil and Costa Rica are worthy of note here: the first, because of its weight in the growth of fertility in the region; the second, because of the rapidity with which change is occurring, a decline unprecedented in Latin America and one of the most rapid on record in the history of the Western world.

41. On the basis of available census data on the number of live births per woman in Brazil, it is possible to estimate the evolution of the birth and gross reproduction rates during the past three decades. [4] According to these estimates, the birth rate in Brazil declined from about 46 per 1,000 in 1940 to less than 40 per 1,000 in 1960, and to a little over 37 per 1,000 in 1970. At the same time, the gross reproduction rate fell from 2.8 in the period 1940-1950 to 2.6 in 1960-1970. A more detailed analysis by physiographic regions, social groups and migration status among the residents of urban areas confirms the slow gradual decline of these rates. [5]

42. The sharp decline in fertility in Costa Rica is clearly shown in various studies. [6] During the 1950s, the gross birth rate reached one of the highest known levels, and, in 1960, it still stood at 48 per 1,000. Subsequently, it began to decline, gradually during the first half of the decade and more rapidly in the second half, so that, by 1970, it had dropped to 35 per 1,000, that is, a reduction of 30 per cent in 10 years.

Hypotheses on demographic change

43. In short, population trends in Latin American countries may be said to have varied widely, having now reached very different stages of the demographic

[3] George Martine and César Peláez, "Population Trends in the 1960s: Some Implications for Development", *Economic Bulletin for Latin America*, vol. XVIII, Nos. 1 and 2, 1973.

[4] Carmen Arretx, *Revisión de las estimaciones de fecundidad de Brasil a base de los años de 1940, 1950, 1960 y 1970*, (Centro Latinoamericano de Demografía, S/66/25).

[5] George Martine and César Peláez, *op. cit.*

[6] See documents presented at the Fifth National Demographic Seminar, Costa Rica, September 1970, particularly Miguel Gómez B., "El rápido descenso de la fecundidad en Costa Rica", pp. 271-308.

transition. In most countries, however, the trend has been towards an acceleration of population growth as a result of the increasing imbalance between the birth and mortality rates. What is likely to be the future course of population growth in such countries? To answer this question properly, it would be necessary to make a careful and far-reaching analysis of the *situation and trends in components of demographic* change and related economic and social factors in each individual country. Such an endeavour goes far beyond the scope of the present study. Nevertheless, some general observations may be made here concerning population growth prospects in these countries.[7]

44. First of all, given that the probable range of *variation of mortality in the future will be relatively* limited, and that international migration, although unpredictable, will probably exert very little influence in most countries, it can be concluded that fertility will be the key variable in the future growth process; its evolution will largely determine the rate of population increase.

45. *Secondly, recent research into the existence of* differential fertility rates and into birth control attitudes and practice in the populations of many countries, together with the growth in the coverage of family planning programmes and the interest of Governments in them, lead to the conclusion that the process of change in the reproductive behaviour of the population is much more dynamic than would be suggested by analyses of recent trends in an over-all indicator, such as the crude birth rate.

46. Thirdly, it is becoming increasingly evident that the progress which has been registered in the technology of birth control techniques, together with the increase in the scope and effectiveness of the mass communications media, has weakened the causal relationship between socio-economic change and fertility decline. These developments would, thus, come to reinforce the prediction made by the United Nations,[8] on the basis of an analysis of the relationship between fertility patterns and socio-economic indicators, that several countries with currently high rates of population growth would now be on the verge of experiencing a drop in their birth rates. The decreases observed in several countries during the past decade would appear to bear *out this predicted trend.*

47. Lastly, it is worth noting that, given recent developments in birth control technology and the mass communications media, declines in birth rates could possibly become accelerated in much the same way as mortality has been lowered in developing regions. That is, the demographic transition which took more than a century to unfold in the technologically advanced countries could be telescoped into a few decades in many Latin American countries.

Urbanization and fertility

48. It is in the urban environment, particularly in the large cities, that the principal changes in reproductive behaviour occur The situations that this social *structure determines, the motivations it induces* and the expectations it creates, constitute the dynamic factor *par excellence* in the process of modernizing demographic behaviour. Although the Latin American city is at once the stage for and the focal point of this transformation, in many countries the very nature of urban development, while creating the conditions essential for change, also maintains other conditions that constitute veritable barriers to the spread of change

49 A brief examination of the cities of the region, viewed as systems for living, suggests the existence of social structures that, perhaps, represent moments in a typical pattern of development, with each moment having its corresponding and clearly defined fertility patterns

50 To illustrate the trend of these changes it may be useful to look at four types of urban establishment. Historical urban social structures can be classified, according to the nature of the predominant *élite*, into aristocracies and *oligarchies. Contemporary structures* can be defined, in terms of the impact of industrialization, into two types of establishment, one, in which the domination of the middle classes becomes stronger, and the other, in which progress in industrialization generates a situation of semi-development, where expectations rise far above concrete possibilities.

51. *Available data would indicate that there has* been a steady evolution in the sense of replacing birth-promoting attitudes, based on an ideology and a religious ethic, with secular criteria, induced by social mobility and consumption, and that these new values *have, in part, emerged out of the transformations of* the *élite* and the consolidation of a middle-class culture.

The structures of the past

52. Here, it may be worth while to refer to cities as they were *typically in the past—generally relatively* small agglomerations that were organized to provide services for a fairly small *élite* during the pre-industrial stages of Latin American development.

The aristocratic city

53. The aristocratic urban establishment was structured around a group of families whose livelihood was based on the ownership and exploitation of land. The relative absence of economic differentiation reflected a social structure in which the *élite* not only occupied the central and predominant place, but, to a large extent,

[illegible]

position. The masses, while more numerous, were stratified in accordance with the location of their activities vis-à-vis the aristocracy.

[7] *Social Change and Social Development Policy in Latin America*, p 47.

[8] *Population Bulletin of the United Nations, No 7* (United Nations publication, Sales No. 64.XIII.2).

54. In this atmosphere of limited opportunities, and, hence, of little mobility, where competitive values had little significance as compared with stratification criteria, the reproduction of the *élite* and the middle classes was ideologically regulated by transcendental norms that favoured abundant fertility, and this also permeated the behaviour of the masses.

The oligarchic city

55. The oligarchic urban establishment reflects a stage of greater differentiation. Exports of raw materials to international markets herein favour the consolidation of a social structure based on an alliance of the interests of landowners and exporters. The size of the city swells and the quantity of the economic surplus multiplies.

56. Exporting requires more specialized services; and, hence, through these changes, new opportunities are created that foster the formation of a more extensive and complex middle class and of lower strata that are larger and yet less diverse. However, within the lower strata, artisan-type skills maintain their traditional importance and lead to the emergence of a *sub-élite*, which gradually organizes itself, often under the guise of forming a workers' culture.

57. The middle classes monopolize opportunities for social mobility, and the *élite* ceases to be a hard core of interrelated families once it has been joined by interests associated with the export trade. After this breakthrough, there is a change in the ideologies justifying the social order. Many of the transcendental notions that formerly governed behaviour become secularized, and the importance of acquisitive values grows.

58. The new levels of competition, however, do not seriously affect the positions held by the *élite,* which tends to retain its traditional reproductive behaviour. As the middle classes increase in size, they strengthen their commitment to secular values, and here the first signs of a reproductive behaviour oriented towards mobility and the acquisition of status can be observed in a slow gradual decline of average family size. The lower strata maintain their traditional level of fertility.

Present-day structures

59. Industrialization brings with it a complete upheaval of the patterns of urban life, a major transformation in the structure of employment and an unprecedented opening up of new opportunities. Cities expand rapidly until, in some cases, they attain the proportion of metropolises and even megalopolises. The growth rate of the economic surplus not only exceeds past trends, but swiftly reaches high levels. Along with schools, the expansion of the urban market plays a key role in the socialization of the population, both institutions creating new expectations and consumer patterns.

60. The *élite* changes its character. A new social pact leads to the gradual admission of industrialists, administrators and technocrats. The norms that determine power structures have to be adjusted to the requirements of a larger, more fluid and complex *élite.* Not only do ideologies become increasingly secularized, they begin to be permeated by concepts that emphasize functionality targets at the expense of values of hierarchical ranking. This expansion opens up new avenues of social mobility, and preference is given to ideologies that justify the social displacement of families and individuals. Some sectors of the middle classes are absorbed into the *élite*, and the rules governing entry into it are partially relaxed.

61. Craftsmanship loses all meaning in city life and the organized industrial workers become the sector through which the social demands of the masses are voiced. The system of qualifications is modified and, along with it, the notion of a natural working-class hierarchy based on skills. It is the access to the urban market, by means of industrial employment and the possibility of influencing the power structure through organization, that determines the degree of integration in the culture of the city. Accordingly, new paths slowly begin to open up for the social mobility of individuals making their way up from the lower classes.

62. The balance between the expectations and the possibilities of mobility is generally critical. Inadequate development is a factor that tends to create expectations that go beyond the available opportunities.

63. Within this general pattern, two stages can be distinguished. The first begins with the crisis of the system of oligarchical domination as, between the fissures of the crumbling order, an establishment evolves in which the middle classes gradually come to play a central role. In the second stage, the main phenomenon is industrialization, whose effects are felt at every level of the social structure but which has a limited capacity for creating a system of life based on technology and on production of the industrial type.

The mesocratic urban establishment

64. In its early stages, industrialization encourages the formation of an urban establishment possessing three fundamental characteristics:

(1) A quantitative increase in the masses, which come to represent a large proportion of the population of the city, but of which only a very small nucleus is politically organized;

(2) An expansion of the middle classes, which increase their political and social influence to a significant degree and which include various entrepreneurial segments of the population;

(3) An intensification of the process of secularization, based on the development of the urban market and on a middle class committed to the values of an acquisitive and socially mobile society.

65. In this context, the rise of the middle classes is bound up with ideologies that question the legitimacy of the existing order and offer alternatives that emphasize the recognition of personal merit. The basic idea

is to create a stable hierarchy that permits the free acquisition of a position in society on the basis of individual ability.

66 As the middle class comes to constitute the principal support of the social order and its level of living rises, so there is an intensification of the competition for the means and symbols that are indispensable for acquiring and maintaining social status.

67. The fate of the masses is determined by their access to stable and productive employment and to culture and by their ability to organize themselves. The objective of the struggle of vast masses is, in any case, *to gain a foothold in the market by means of organizations* that emphasize solidarity, and, thus, considerations of acquisition and social mobility filter down to them only in a slow and selective manner.

68. Fertility follows this general pattern extremely closely. The social groups most intensely committed to the acquisition of status tend to employ birth control, a tendency which rapidly becomes one of the distinctive *features of the nascent culture of the middle class.* It will likewise be found that the frequency of induced abortions is greater among these groups. The traditional *élite* groups see reproduction in terms of transcendental considerations, while among the lower classes, children continue to be an inevitable phenomenon.

The semi-industrial city

69. The semi-industrial city is characterized by the initiation of a far-reaching transformation of urban culture, by the imbalance between social expectations and the ability of the system to fulfil them, as well as by an imbalance between the requirements for and the possibility of resolving the problems posed by the *human agglomeration*

70. The middle classes currently constitute a large proportion of the population There exists a more complex *élite* in which primary relationships lose their relative importance and a social stratification of the masses is taking place as a result of the appearance of marginality.

71. Social capillarity increases, but the secularization and universalization of customs come up against limits that are implicit in prestige systems and in the distribution of opportunities for mobility. The fruits of *urban progress are distributed on a selective basis,* so that only the upper segments of the popular sectors acquire access to the market and to social mobility. This insufficient *and selective diversification* gives greater stability to prestige systems and to principles that were traditionally associated with the rank of the families.

72 Below the level of the specialized industrial workers, the various nuclei that are in situations of marginality organize themselves in terms of their most fundamental problems of incorporation, so as to be assured a foothold in the market.

73. Reproductive behaviour conforms to the following set of situations:

(*a*) The new complexity of the *élite* and the replacement *of the system of primary relationships by a* system of representation and administration of interests leads to a lower birth rate in accordance with heightened interpersonal competition;

(*b*) In the middle classes, the birth rate continues to go down as consumption levels go up and competition for opportunities of social mobility increases;

(*c*) A similar phenomenon occurs among industrial *workers belonging to trade unions as they develop* aspirations towards mobility and become consumption-minded;

(*d*) In marginal sectors, political mobilization and basic organization are factors that tend towards a rationalization of reproductive behaviour, as opposed to what happens among sectors that still constitute an amorphous mass

74 *Bearing in mind the limitations of the process* of urbanization and cultural secularization, on the one hand, and the intensification of aspirations towards consumption and mobility, on the other, one finds that an increase in the frequency of induced abortions is discernible, especially among the masses

Social structure of the city and the impact of selected variables

75. Recent research would indicate that the behaviour of certain key variables which influence the reproductive conduct of the population would seem to modify their effects according to types of urban social structures. Unfortunately, the results are barely indicative of the existence of relationships, and the data, at most, permit one to formulate educated guesses concerning their significance.

Educational level of mother

76 The data show that the educational level of the *mother influences reproductive behaviour* in Latin America, as elsewhere. Studies indicate an inverse ratio between the number of children and women's education. *Nevertheless, although the relationship is monotonic* in all the cases studied, there are important variations as concerns birth rate and educational levels. In some urban centres, the differences in birth rate attributable to education would seem to be smaller. In other cities, the critical point at which the educational level has the effect of reducing the birth rate is higher, and different critical levels may even exist. It is clear that although education has an unequivocal effect on the birth rate, its role varies according to the specific social context.[9] (See table 4)

TABLE 4. AVERAGE NUMBER OF LIVE BIRTHS, BY EDUCATIONAL LEVEL OF WOMEN INTERVIEWED

Educational level	*Bogota*	*Buenos Aires*	*Caracas*	*Mexico City*	*Panama City*	*Rio de Janeiro*	*San Jose*
All women	*3.16*	*1.49*	*2.97*	*3.28*	*2.74*	*2.25*	*2.98*
No education	4.12	2.50	4.27	4.53	4.00	3.33	3.89
1 to 3 years of primary education	3.36	1.55	3.82	4.16	4.18	2.93	3.73
4 years or more of primary education	3.17	1.90	2.97	3.83	3.73	2.46	3.74
Primary education completed	3.23	1.74	2.61	3.14	3.14	2.17	2.83
1 to 3 years of secondary education	2.89	1.46	1.88	2.20	2.67	1.63	2.26
4 years or more of secondary education	2.52	1.35	2.16	1.85	2.14	1.43	1.91
Secondary education completed	2.52	1.07	1.71	1.83	1.65	1.38	2.00
Less than 5 years of university education	0.68	1.12	0.68	1.41	1.09	1.05	1.59
5 years or more of university education	1.89	1.03	1.31	1.89	1.22	1.21	1.18
Not stated	2.00	1.23	6.00	—	3.00	2.00	—

SOURCE: Carmen A. Miró, *Un programa de encuestas defecundidad en América Latina: refutación de algunos conceptos arróneos,* Series A, No. 49 (Santiago, Chile, Centro Latinoamericano de Demografía, 1970), cf. p. 15.

77. Several hypotheses will serve to illustrate the trend of these variations. It would, in fact, appear that, in the social environments having a more widespread experience of mobility and market participation and a higher degree of cultural secularization, sizable increases in educational level lead to small differences in birth rates, the critical threshold being reached only with respect to those who, in practice, have no education; in other words, those who are excluded from the market and from mobility.[10]

78. In urban social environments having low levels of market participation and wherein mobility experiences are more restricted and occur within a less secularized culture, education has a different role. As a general rule, birth rates are higher; and, hence, rates similar to those in the first type of environment described require a lengthier period of formal education. Futhermore, there are significant differences in the number of children as a result of the education received. A rapid examination of education thresholds appears to show a direct relationship between the greater degree of mobility and participation in the market and the critical level of education at which the birth rates begin to fall.[11]

79. It should also be added here that in the environments in which the standards of a transcendental culture prevail, the more educated the mother, the more likely she seems to adopt secular notions with regard to reproductive behaviour.

Participation of women in urban economic activity

80. Studies show that the birth rate is lower for working women.[12] Although this is the conclusion reached in most research, the data do not make it possible to clarify the significance of the relationship. The central assumption is that there is a fundamental incompatibility between work outside the household and bringing up children. This would seem to be borne out by studies showing that the difference between the ideal number of children aspired to and the actual number is significantly higher with working women, owing to a greater propensity to remain single or to marry at later ages.[13] (See tables 5-8.)

TABLE 5. ECONOMICALLY ACTIVE FEMALE POPULATION, BY CITY AND COUNTRY

(Percentage)

City	*Economically active* [a]	*Country*	*Economically active* [a]
Bogota	39.1	Colombia	20.3
Buenos Aires	38.2	Argentina	23.2
Caracas	26.8	Venezuela	20.2
Mexico	26.8	Mexico	19.7
Panama	38.1	Panama	24.7
San Jose	39.5	Costa Rica	17.5
Rio de Janeiro	30.7	Brazil	18.4

SOURCE: Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group II, variables 25 × 12; and International Labour Office, *Yearbook of Labour Statistics, 1969* (Geneva). Based on data from table 2 A.

[a] Age 15 and over, according to the 1960 censuses.

81. There are indications that work outside the home does not of itself determine a lower birth rate, as compared with the influence exerted by the motivations to take an outside job. It may be observed that in white-collar jobs, which represent a more definite trend towards mobility and consumption, the incompatibility between job and home is intensified.

efectiva en República Argentina segú algunas características de la madre, Series C, No. 96 (CELADE, 1967); M. Elsa Cerisola, *Fecundidad diferencial en la República del Paraguay según condición de ruralidad y nivel de instrucción de la mujer,* Series C, No. 101 (CELADE, 1967).

[10] Virginia Rodríguez, *op. cit.*

[11] Alfredo Lattes, *op. cit.*

[12] Ana María Rothman, *La participación femenina en actividades económicas en su relación con el nivel de fecundidad en Buenos Aires y México,* Series C, No. 108 (CELADE, 1969); Paula Hollerbach Hass, *Maternal Employment and Fertility in Metropolitan Latin America* (Durham, North Carolina, Duke University, 1971); Henry Kirsch, "Development strategy implications of population growth and labour force absorption in Latin America" (1971).

[13] Ana María Rothman, *op. cit.*

TABLE 6 ECONOMICALLY ACTIVE FEMALE POPULATION BY EDUCATIONAL LEVEL

(Percentage)

City	*Percentage of economically active by educational level*				*Distribution of economically active female population by educational level*				
	No education to 3 years primary	*4 years or more primary and primary completed*	*Secondary*	*University*	*No education to 3 years primary*	*4 years or more primary and primary completed*	*Secondary*	*University*	*Total*
Bogota . .	40 6	37.2	38 2	69.0	38 8	30 3	28.3	2.6	100 0
Buenos Aires .	39 6	31.6	46 4	65.9	6 9	52 4	29.3	11 4	100 0
Caracas	29.4	29.7	35 3	57.5	32.3	38 5	22.8	6 4	100.0
Mexico . .	37.9	27 5	37 1	50 0	36 3	29 3	26 1	8.3	100.0
Panama .	32 0	32 0	39.0	63.3	7 5	31 7	45 0	15 8	100 0
San Jose .	34.1	36 2	42 5	70.5	22 6	37 9	27 8	11 7	100.0
Rio de Janeiro	35.3	24 5	31.8	49 3	34 8	28 6	32 0	4 6	100 0

SOURCE: Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group II, variables 20 × 25

TABLE 7 DISTRIBUTION OF ECONOMICALLY ACTIVE FEMALE POPULATION, BY OCCUPATION

(Percentage)

Occupation	*Bogota*	*Buenos Aires*	*Caracas*	*Mexico City*	*Panama City*	*San Jose*	*Rio de Janeiro*
Professional	0 9	0.7	2 3	3 0	1.3	1 1	1.7
Manager .	4 0	1.5	2.1	5.5	7 3	3.8	14 2
High-level supervisor	5.0	19.4	15.5	11 7	26 5	22.6	11.2
Low-level supervisor	17.9	28 4	14.0	25 6	6.3	13 5	8.1
Skilled manual worker	36 0	33 8	24 8	27 0	27 1	44 0	12 9
Unskilled manual worker	36.2	16 2	41.3	27 2	31 5	15.0	51.9
Total	*100 0*	*100 0*	*100.0*	*100 0*	*100 0*	*100.0*	*100.0*

SOURCE: Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group II, variables 14 × 26

TABLE 8. PERCENTAGE OF FEMALE POPULATION NOT ECONOMICALLY ACTIVE, AND ECONOMICALLY ACTIVE WORKING IN AND OUTSIDE THE HOUSEHOLD

	Bogota	*Buenos Aires*	*Caracas*	*Mexico City*	*Panama City*	*San Jose*	*Rio de Janeiro*
Not economically active	60 9	61 8	73.2	73 2	61 9	60 5	69 3
Working in the household	19.7	8.5	7.6	9.3	7.6	14 2	13.1
Working outside the household	19 4	29 7	19.2	17 5	30 5	25.3	17 6
Total	*100.0*	*100.0*	*100.0*	*100 0*	*100 0*	*100 0*	*100 0*

SOURCE: Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group II, variables 25 × 12.

82. It would also appear that urban culture conditions the degree of compatibility between women's roles in society. In cities, where market experience and mobility affect small groups of the population and where the secularization of culture is in its early stages, a high fertility rate is to be observed, along with inadequate knowledge of contraceptive methods, little education, lack of stimuli to undertake work outside the home, and, hence, a clear incompatibility between job and home.

83. Existing data show that in cities where consumer society organization predominates, women constitute a larger share of the labour force, and a greater proportion of the female labour force is employed in productive employment requiring some degree of qualification; thus, women generally have attained educational levels comparable to those of men.

84. It should also be added that there appears to be a clear link between the type of urban social structure and the levels of qualification and participation of women in the labour force by age. There are indications that in the least developed urban social systems, the majority of working women have low levels of schooling. This means that as women acquire more education, their share in employment drops, with the sole exception of the group that reaches university level. In cities, however, where social mobility is intensified and purchase criteria predominate, the converse ratio should occur, resulting in an increasingly smaller proportion of unqualified women.

85. A similar situation exists with regard to age participation. Data indicate that in the most traditional urban systems, there are few differences in female participation by age, and there is perhaps a slight tendency for participation to increase between 40 and 50 years of age. However, where the population is characterized by a higher degree of market experiences and mobility, the tendencies appear to be different. The increase in female participation would be such as to gradually become a decreasing function, illustrating a new adjustment between consumption aspirations, mobility and family life.

86. To sum up the foregoing, it is obvious that the development of the aforementioned tendencies reflects the emergence of a new style of life dominated by a consumer culture wherein the market and social mobility finally redefine woman's role in society. The increase in female participation in economic activity is linked with schooling, with a slow but steady withdrawal from traditional low productivity employments, and with a postponement, first, of the age at marriage and, subsequently, of childbearing. The net result is a drop in the birth rate. [14]

Social stratification, mobility and reproductive behaviour

87. Thus far, the little research which has been carried out on the relationships between the birth rate and social stratification has, unfortunately, utilized partial indicators and aggregate categories. As a general rule, employment status has been used as an indicator to demonstrate the theory that the higher the occupational rank of the husband, the fewer children families tend to have. [15] As in the case of the above-mentioned variables, this ratio appears to be a function of the type of urban social structure.

88. Indeed, under certain conditions, the regulation of the number of children in accordance with rational criteria is more closely associated with middle-class values and culture, while in other circumstances these tendencies penetrate the *élite* levels and filter down towards the lower classes. The net impact on the city's birth rate evidently depends upon the percentage of the population in each stratum. Where such behaviour is found only in the middle class, the effect on the city's birth rate will not be significant, given the former's reduced number. Growth of the middle classes would bring a larger reduction in the city's reproduction rate and a gradual dissemination of their criteria amongst the *élite* and lower classes, resulting in a clear drop in average urban fertility. (See tables 9-11.)

89. The few existing studies on social mobility and fertility complement these theories. Research shows that the educational success of low class students may be related to the smaller size of the original family, and that the groups experiencing ascending mobility are typified by smaller family nuclei than the downwardly mobile, while those which do not undergo changes in status have larger families than the rest. [16]

90. There exist various indications and partial research results which suggest that political mobilization and organization could constitute a factor which would rationalize reproductive behaviour. While no conclusive evidence can be found, existing data are consistent with this theory. [17]

91. In the first place, it has been observed on various occasions that among the popular classes, the members of Protestant groups, typified by a high level of organization and cohesion, have smaller families. It has been noted that in the popular classes, fertility tends to drop first in the organized workers category. In both cases, while the variables involved would by themselves explain the lower reproduction rate, it would, however, be erroneous to ignore the role of conscientization in these sectors.

92. Recent research shows that, in the marginal strata, fertility declines with community organization and political mobilization. Studies of the same age cohorts show that schooling and the participation of women in the labour force have different effects on reproductive behaviour, depending upon the existence of the above-mentioned conditions. In an amorphous social group, the employment and education of women are variables that go a long way towards explaining the differences in fertility. However, where unstable educational levels and participation in employment exist, and where the social group is organized to attain goals, it may be observed that the birth rate also tends to drop.

93. Apparently, the mobilization of a marginal group to achieve specific aims creates in individuals a level of consciousness which contributes to a better understanding of their situation in relation to the structure of society and which induces conduct tending to link individual destiny to specific action projects. Mobilization creates expectations of a better life and forms aspirations to mobility in sectors which lack the attributes allowing them to participate in the market; it is a source of socialization which, through the understanding of the political opportunities offered to acquire concrete benefits from the authorities, aids the gradual assimilation of rational principles of action. It may also be assumed that the organization resulting from the initial mobilization completely redefines the situation of individuals and their families; by replacing the traditional solidarity, based on primary relationships for

[14] Paula Hollerbach Hass, *op. cit.*

[15] M. Helena Henriques, *La movilidad social y la fecundidad en Rio de Janeiro,* Series C, No. 112 (CELADE, 1968).

[16] Ruth Sautú, research carried out on the basis of the university census of Buenos Aires, 1958; and the survey on stratification and social mobility in Greater Buenos Aires, carried out in 1960-1961 and published in the *Research Bulletin* of the Institute of Sociology of the University of Buenos Aires, 1963.

[17] Duque and Pastrana, *Las estrategias de supervivencia económica del sector popular urbano* (ELAS, FLACSO, 1973); Ramiro Pavon González, *Fecundidad diferencial en poblaciónes periféricas del Gran Santiago* (CELADE, 1972).

Table 9. Female age-specific activity rates, by urban area and by country

(Percentage)

Age (years)	A. *Female age-specific activity rates, by urban area*							B *Female age-specific activity rates, by country, around 1960*						
	Bogota	*Buenos Aires*	*Caracas*	*Mexico*	*Panama*	*San Jose*	*Rio de Janeiro*	*Colombia*	*Argentina*	*Venezuela*	*Mexico*	*Panama*	*Costa Rica*	*Brazil*
20-24	45.6	59.1	32.0	32.8	37.4	34.6	28.0	26.3	39.7	25.8	23.0	31.2	24.4	22.5
25-29	37.2	36.9	30.6	25.8	38.2	35.7	26.6	21.6	29.4	23.8	16.9	28.3	20.3	18.8
30-34	36.4	34.4	31.2	29.2	33.9	30.6	24.4	19.8	24.4	22.9	16.1	27.7	18.8	17.4
35-39	39.7	37.0	30.7	29.6	39.3	33.2	19.9	19.7	22.6	22.0	17.1	27.1	17.9	17.2
40-44	37.0	30.1	38.2	33.0	41.9	33.3	18.4	19.8	21.5	21.0	18.3	27.0	16.6	16.8
45-49	37.3	23.5	31.1	34.6	40.3	30.0	22.2	19.3	19.4	19.3	18.3	26.1	14.9	16.3
50 or more	25.9	22.1	29.8	32.0	32.6	34.2	9.2							

Source. For A Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group, variables 14 × 26
For B Centro Latinoamericano de Demografía, *Demographic Bulletin*, Year 2, vol III (January 1969), table 5; and El Colegio de México, *Dinámica de la población de México* (Mexico, 1970), table VI-7.

TABLE 10. FEMALE ECONOMIC ACTIVITY, BY MARITAL STATUS

(Percentage)

City	Single	Married	Consensual union	Widowed, separated etc.	Total
A. Activity rates, by marital status					
Bogota	72.0	25.4	34.3	62.1	39.3[a]
Buenos Aires	70.2	25.7	21.1	67.6	35.5[a]
Caracas	57.9	10.6	13.5	54.2	31.8[a]
Mexico	62.0	17.6	27.6	61.6	30.4[a]
Panama	55.6	31.5	24.4	59.6	37.9[a]
San Jose	60.4	21.5	26.6	50.5	33.2[a]
Rio de Janeiro	49.3	12.2	29.3	43.9	23.3[a]
B. Distribution of active women, by marital status					
Bogota	34.9	41.4	4.0	19.7	100.0
Buenos Aires	34.0	55.7	0.5	9.8	100.0
Caracas	29.2	34.4	6.3	30.1	100.0
Mexico	33.7	37.7	7.2	21.4	100.0
Panama	25.1	34.3	17.1	23.5	100.0
San Jose	38.6	39.1	5.9	16.4	100.0
Rio de Janeiro	40.5	34.3	7.1	18.1	100.0
C. Distribution of inactive women, by marital status					
Bogota	8.8	78.6	4.9	7.7	100.0
Buenos Aires	8.0	88.3	1.1	2.6	100.0
Caracas	9.0	59.1	19.1	11.9	100.0
Mexico	9.0	77.0	8.2	5.8	100.0
Panama	12.3	45.5	32.5	9.7	100.0
San Jose	12.6	71.1	8.2	8.1	100.0
Rio de Janeiro	12.7	75.1	5.2	7.0	100.0
D. Distribution of all women, by marital status					
Bogota	19.1	64.0	4.5	12.4	100.0
Buenos Aires	17.2	76.8	0.9	5.1	100.0
Caracas	16.0	51.3	15.0	17.7	100.0
Mexico	16.5	65.0	7.9	10.6	100.0
Panama	17.2	41.2	26.7	14.9	100.0
San Jose	21.3	60.5	7.4	10.8	100.0
Rio de Janeiro	19.2	65.5	5.7	9.6	100.0

SOURCE: Centro Latinoamericano de Demografía (PECFAL-U), Tabulation Group II, variables 19 × 26.

[a] Total activity rates vary from those of table 2 due to the different number of respondents.

TABLE 11. AVERAGE NUMBER OF CHILDREN BORN TO MARRIED WOMEN AND WOMEN LIVING IN CONSENSUAL UNION, BY OCCUPATIONAL CLASS: MEXICO, BUENOS AIRES AND RIO DE JANEIRO

City and occupational class	Total women		Total children	Average number of children
	Percentage	Absolute		
Mexico				
Superior non-manual workers	17.68	285	977	3.43
Inferior non-manual workers	27.42	442	1,608	3.74
Manual workers	54.90	885	4,035	4.60
Total	*100.00*	*1,612*	*6,620*	*4.16*
Buenos Aires				
Superior non-manual workers	9.56	151	268	1.91
Inferior non-manual workers	45.47	719	1,264	1.76
Manual workers	44.97	711	1,332	1.91
Total	*100.00*	*1,581*	*2,864*	*1.84*

TABLE 11 (*continued*)

City and occupational class	*Total women*		*Total children*	*Average number of children*
	Percentage	*Absolute*		
Rio de Janeiro				
Superior non-manual workers	13 20	228	532	2.33
Inferior non-manual workers	31.33	541	1,221	2 26
Manual workers	55.47	958	3,030	3.16
Total	*100 00*	*1,727*	*4,783*	*2 77*

SOURCE. María Helena Henríquez, *La movilidad social y la fecundidad en Río de Janeiro* Series C, No. 112 (Santiago, Chile, Centro Latinoamericano de Demografía, 1968), p 8

survival in a hostile environment, with the solidarity from the attainment of common goals through the power derived from greater cohesion, the idea that rational behaviour can redefine the destiny of the individual is reinforced.

PUBLIC ACTION IN THE FIELD OF POPULATION

Considerations with regard to population policies

94. One of the peculiarities of the Latin American situation is the intervention of the State in population matters, to a considerable extent in some countries and much less in others. This phenomenon is very likely due to the role which the State has played in the development process and to the long-standing tradition of public health and social medicine, which is characteristic of most of the countries of the region.

95. The intervention of the public sector in this respect has obeyed two sets of considerations. The first, of an abstract nature, are founded on the projection of a model of future society and on the outline of global development strategies, wherein it is assumed that both the volume of the population and the demographic growth rates will be of major relevance. The second have to do with the health and well-being of the families.

96. By and large, Latin American Governments have avoided explicit definitions of their population policies. Where specific proposals have been formulated with a view to modifying birth rates, they have taken a form which could be described as a demographic policy. The explicitness and implementations of such targets

ever, cover the full extent of the public sector's involvement Some countries have recognized the advisability of the State's refraining from formulating explicit demographic targets, but this does not imply the cessation of such specialized services as the community may require and which may have a bearing on the birth rate This neutrality of the public sector has not been the rule everywhere, in some cases, commitments for the provision of services have been so far-reaching that they have in fact constituted tacit demographic objectives, while elsewhere they have been geared strictly to direct social demands and, in other situations, to marginal considerations.

Social consensus and the justification of state intervention

97 A summary review of the situation indicates that, in formulating policies whose main purpose has been to alter the birth rate, a fundamental role has been played by interpretations of the nature of the development process and of the destiny of the country as a social project and by the leanings of religious groups and institutions exercising an influence on the definition of the community's moral values.

98 Such interpretations have served as a basis for the formulation of these policies, wherever a genuine consensus has existed This, however, has been the exception rather than the rule Where no consensus has evolved, the conflicting interpretations have prevented the achievement of these objectives A power of veto has, likewise, been wielded by religious groups.

99 The State's commitment to provide mere services requires, in practice, a much lesser degree of consensus. Programmes have been organized in order to meet concrete health requirements and have spread, thanks to the support of the social sectors and professional groups most directly concerned The relative neutrality of the State in terms of the establishment of demographic targets has partially reflected the dissuasive capacity of dissident sectors of opinion. Moreover, the existence of programmes that commit the public sector often signifies broad acceptance of a set of indispensable measures, which even its opponents are prepared to tolerate.

100 The justification for such policies varies according to whether or not the State holds a neutral position with regard to the decisions of the family. Efforts directed towards alteration of the reproduction rate derive from economic considerations concerning the rate and nature of development, from concepts of land settlement and territorial integration and from geopolitical visions of power and international influence.

101. On the other hand, when a policy of neutrality is adopted and the public sector's infl 's exert

TABLE 14. DATES OF INITIATION AND CONSOLIDATION OF FAMILY PLANNING ACTIVITIES IN THE PUBLIC SECTOR

Date of initiation	Country	Date of consolidation 1967	1968	1969	1970
Before 1960 .	Barbados	X			
1963 . .	Jamaica	X			
1964 . .	Chile		X		
	Trinidad and Tobago		X		
1965 .	Venezuela		X		
1966	Colombia		X		
	Dominican Republic		X		
1967	Costa Rica			X	
	Honduras			X	
	Nicaragua		X		
	Panama				X
1968 .	El Salvador			X	
1969 .	Ecuador				X
	Guatemala				

countries had less than 10,000 women of childbearing age per clinic.

115. Neither do the results of the programmes seem satisfactory: in 13 countries, less than 2 per cent of the women were protected and only in two was the proportion above 10 per cent.

116 On the basis of a very preliminary review of these data, three situations may be distinguished: first, those countries which in fact have no infrastructure of services, secondly, those which are in the process of expanding such services; and, lastly, those which already have satisfactory facilities.

117. In countries with a high birth rate, the lack of infrastructure may result from policies (or rather, demographic principles), which are opposed to state intervention, or from the absence of an adequate system of medical services.

118. Where the infrastructure is insufficient and is in the process of being expanded, the critical factors would appear to be that the programmes have only recently been consolidated and that the system of health institutions is still very inadequate In turn, countries which already have adequate services either began much earlier and/or possess a better developed public health system, or else they are small countries with a low level of urbanization but with a rural population concentrated in some densely populated areas.

119 The results of the programmes in countries that have adequate facilities appear, in their turn, to depend upon the general stage of development and modernization

CONCLUSIONS

120. The foregoing discussion shows how current interest in Latin America in population problems is determined by factors and circumstances that arise from the level of economic growth and from the process of social modernization. These factors and circumstances have gradually found their expression in a revision of the development system and of its objectives, in profound modifications in the conduct and values of the population and in new solutions and institutional attitudes Given the disequilibrium and ambivalence that

TABLE 15. COUNTRIES CLASSIFIED BY NUMBER OF WOMEN OF CHILDBEARING AGE PER FAMILY PLANNING CLINIC, AND PERCENTAGE OF PROTECTED WOMEN OF CHILDBEARING AGE AT THE BEGINNING OF 1969

Percentage of protected women of childbearing age	Number of women of childbearing age per family planning clinic: Under 10,000	10,000-20,000	20,000-50,000	Over 50,000
Under 3		Colombia Paraguay Guatemala Nicaragua El Salvador	Haiti Uruguay Dominican Republic Ecuador	Argentina Brazil Mexico
From 3 to 5		Panama Honduras		
Over 10	Chile Costa Rica			

exist in a state of semi-development, the subject has lost its apparent specificity and has, instead, become bound up with the concepts and ideologies of social change and has come to constitute, in its own right, one of the fundamental variables in the outlines and projects of society that are currently being debated.

121. It is, therefore, understandable that, when viewing the question of population within the context of present-day diagnoses and theses of development, the region should place so much emphasis on speeding up the process and clarifying its objectives. Many of the dilemmas that arise in discussing the role of population in development (and these are complicated even further by the introduction of immediate political considerations) are in fact dilemmas borrowed from the definition of the social and political objectives that determine economic growth. All this derives from a recognition of the crisis of conventional models of social coexistence and economic transformation and from a desire to explore new avenues of social integration and institutional rationalization in order to overcome the social and political barriers that the economic process has encountered at this particular stage of semi-development.

122. The semi-development in the region has, likewise, brought major changes in population behaviour, particularly in urban centres. This is an obvious result of progress. What began as a barely perceptible adjustment is rapidly becoming the affirmation of new values and models of life. In a little over half a century, a secular culture has evolved that is run more and more along acquisitive lines.

123. The imbalances and lack of continuity that are characteristic of semi-development give rise to a peculiar demographic situation in which the growth rate of the population increases. Progress, though evident, is limited and is selective in the way it affects classes, sectors and groups of society.

124. The secularization of behaviour is reflected in three parallel but asynchronous processes that define the nature of the system of modernization:

(*a*) The intensification of market relationships and, concomitantly, the incorporation of new sectors of the population;

(*b*) The diffusion and intensification of experiments in social mobility;

(*c*) The expansion of the citizenry by means of political mobilization and the appearance of basic organizations.

125. Available information is indicative of the role that these processes play in the secularization of reproductive behaviour and of the selective way in which it evolves. In a stage of semi-development, its over-all impact is necessarily slow and gradual, although the apparent stabilization of the rate of reproduction conceals underlying dynamic situations. The clearest symptoms of this trend are undoubtedly the redefinition of the role of women in society and the readjustment of family relationships in line with a more competitive, unstable and fluid urban context.

126. Further proof that a definite evolution is taking place is the fact that, contrary to what happened in the industrialized countries in the past, population problems in Latin America have become a matter for action by the public sector. This raises the question of the definition of alternative development styles and the existence of social requirements and demands. State action has often taken place without there being any real consensus, simply because the State has had to face the painful realities of human reproduction among the urban lower classes.

127. The foregoing all goes to show that the incorporation of the population variable in development policies must reflect the variety of situations that exists in Latin American countries and that the use of birth control as an alternative to development, in any case, implies neglect of the social forces that generate changes in reproductive behaviour.

128. It is also obvious that interpretations of population problems have evolved at two fairly isolated levels: at one level, the macro-interpretations which, generally speaking, do not consider social requirements and demands; and, at the other, a more pragmatic attempt to solve specific problems of health and well-being directly. Population policies must be capable of integrating both approaches.